

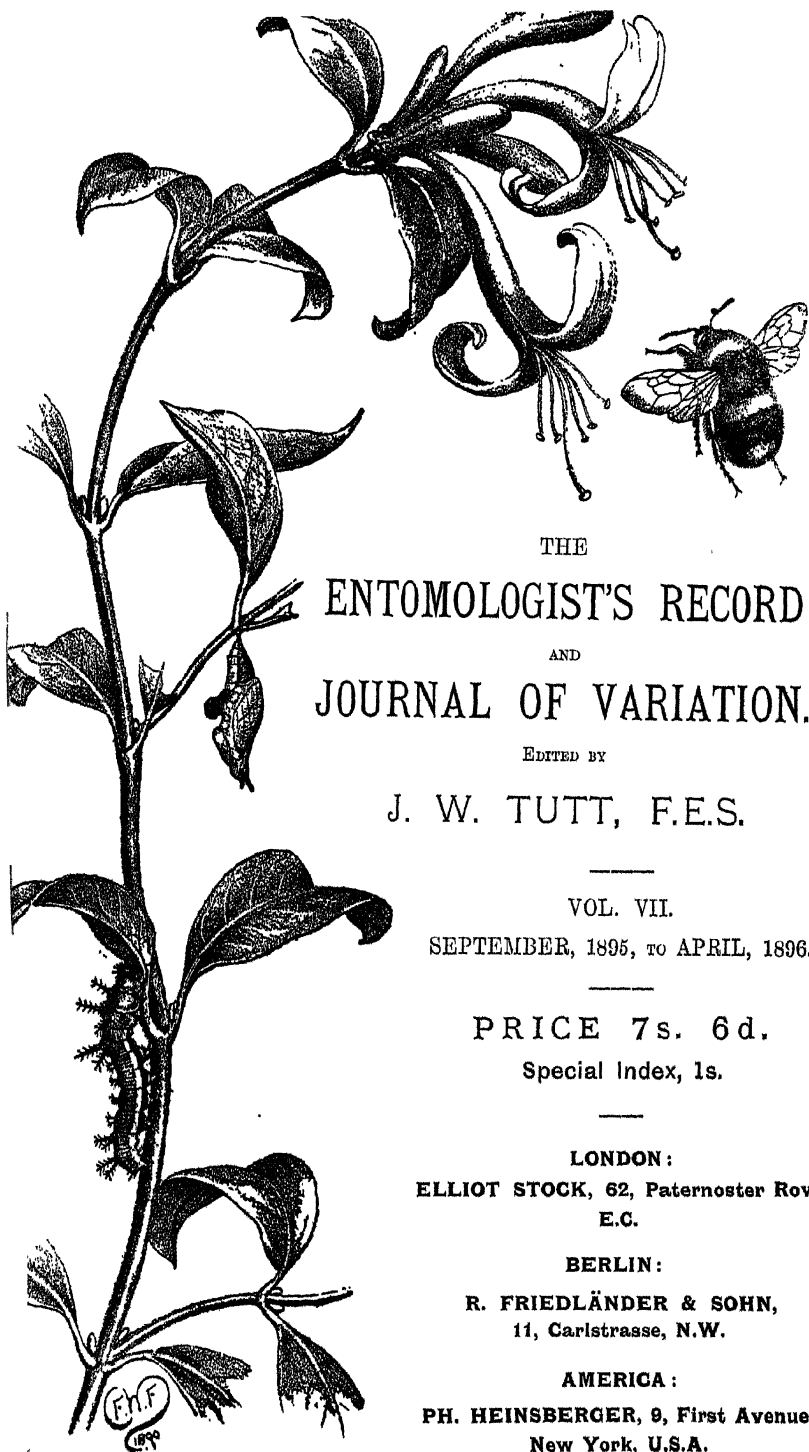


AGRICULTURAL RESEARCH INSTITUTE  
PUSA









THE  
ENTOMOLOGIST'S RECORD  
AND  
JOURNAL OF VARIATION.

EDITED BY

J. W. TUTT, F.E.S.

VOL. VII.

SEPTEMBER, 1895, TO APRIL, 1896.

PRICE 7s. 6d.

Special Index, 1s.

LONDON:

ELLIOT STOCK, 62, Paternoster Row,  
E.C.

BERLIN:

R. FRIEDLÄNDER & SOHN,  
11, Carlstrasse, N.W.

AMERICA:

PH. HEINSBERGER, 9, First Avenue,  
New York, U.S.A.

## PREFACE TO VOL. VII.

---

We have, on the completion of another volume, to tender once again our warmest thanks both to our subscribers and contributors.

The 12 numbers comprising this volume have been issued in eight months. The contents, we venture to think, will bear comparison with those of any previous volume, and, in spite of the frequency of our publication, two double numbers have had to be issued to clear off accumulations of material.

The publication of the Magazine, however, more frequently than once a month, has not, as one would have supposed, been universally approved, and after the completion of the next volume (*i.e.*, when a new volume commences with the new year) it is our present intention to revert to the monthly issue. At the same time we are very grateful to those who have written so kindly and asked us to reconsider this decision. Amongst others, Sir Archibald Buchan-Hepburn writes :—" I regret to see in the last number of the *Entom. Record* that you propose to revert to the original monthly publication. This you will no doubt agree with me in considering a retrograde step ; one great advantage of the present mode is that notices, etc., are kept up to date. . . . The more often the publication is put into my hands (and I am sure this is the opinion of the larger number of your subscribers) the better pleased I am, . . . at any rate, I hope you will see your way to publish 48-page numbers monthly. . . . I do not often interfere in matters of this sort, but on this occasion I feel that the majority of your subscribers would support you in continuing the present arrangement, and if you are not afraid of the increase in your labour of editing, they need not fear the slight increase of the annual subscription." Mr. Horne, of Aberdeen, writes :—" I am very sorry that you intend to revert to the old plan of publishing the *Record* monthly. I would petition in favour of a continued fortnightly publication. My entomological education has mostly been received from the pages of the *Record*, and it cannot appear too often for me. I fully believe that others could say the same, although they might not care to openly admit it." We are, of course, in our subscribers' hands. Our own services and those of Mr. Page, F.E.S., are absolutely gratuitous.

We shall attempt, as hitherto, to deal with the various subjects which are of special interest to the field naturalist. At the same time, we shall continue to keep our readers abreast of the scientific advance which is taking place so rapidly in entomological as in all other sciences. That we have been fairly successful in doing this will, we think, be conceded.

We shall be very pleased to receive " Field Notes," " Practical hints as to rearing larvæ and pupæ," " Observations on the life-histories and habits of insects," from any source. Notes dealing with such subjects as these are always interesting to a large number of readers.

To Mr. G. B. Routledge, F.E.S., who has the Special Index in a very forward state, our thanks are especially due.

We will only add, in conclusion, that we shall be thankful for all help which our subscribers can give us in making the Magazine known to the ever-increasing army of recruits who are continually joining our ranks.

# The Entomologist's Record

## AND

### JOURNAL OF VARIATION.

---

VOL. VII. No. 1.

SEPTEMBER 15TH, 1895.

---

#### The Resting Habit of Insects as Exhibited in the Phenomena of Hybernation and Aestivation.\*

By J. W. TUTT, F.E.S.

The old notion that the evolution of the organic world was brought about by the action of internal forces appears to have almost entirely given place, in the minds of modern philosophers, to the belief that the lines on which evolution proceeds are entirely determined by external influences, and that, far from such influences having played but a secondary part in the process of evolution (in the direction of improving and modifying the results produced by the internal forces), the evolution of organic beings is due to the action of these external forces upon the organism itself. The older view ascribed, as it were, to organisms a motive force; the view taken now is that the internal forces, so far as they exist, are only made active by their reaction to the external forces which surround the organism.

In his *Effect of External Influences upon Development*, Professor Weismann illustrates the potency of external influences by various examples, and shows how the vital manifestations of animals and plants are ultimately reactions to such influences. He compares animals and plants to "machines, so constructed that stimuli from the outer world cause them to act in the most purposeful manner for their own maintenance." The adaptations, which are the result of such action and reaction, exist everywhere among organic beings to a very high degree, although it follows of necessity that such adaptations must be considered as relatively rather than absolutely perfect. This power of adaptation proves that the internal forces of the organism have helped to bring about the desired result, but only in response to external stimuli, which determine the lines on which the internal forces shall act. If this be admitted, and it is difficult to see how it can be denied, we acknowledge the efficiency of external causes to bring about evolution; but in what way the external stimuli have acted on the organism, and in what way the internal forces have reacted in response to the external stimuli so as to bring about the changes necessary in the formation and transformation of organisms is not at

---

\* Some notes suggested by The Romanes Lecture of 1894, entitled, "The Effect of External Influences upon Development."

all clearly understood, although there is no lack of theories regarding individual cases. As a matter of fact, since the external forces which go to make up the sum total of environment are so numerous, and in many cases so different, forming indeed combinations so varied that no two environments are perhaps precisely similar, it must be evident that each particular case must be judged on its merits, and that due value must be given to all the available facts before an explanation of any phenomenon can be considered as valid. It is with the intention of suggesting explanations of two or three familiar phenomena mentioned by Professor Weismann that the following notes are offered.

The Professor writes: "It is often assumed, without much proof, that a certain variation of a living being is the direct consequence of an external influence, simply because the variation in question is, in fact, in some causal connexion with a definite external influence: such an assumption is, however, founded on a totally false idea as to the interconnexion of the phenomena. In many cases this will readily be granted." The first illustration of this point which Professor Weismann gives is the phenomenon of hybernation, a phenomenon, I need hardly say, of the greatest interest to entomologists. "Suppose for instance that we assert," he says, "that cold is the actual cause of the winter-sleep of marmots. It is clear that this statement is incorrect, and that not the cold, but the peculiar organisation of the marmot, causes the reaction of hybernation: cold cannot throw a dog or a bird into a state of slumber for the winter. We are here, therefore, concerned with a special adaptation of the organism to a stimulus—cold—which affects it in such a manner that it escapes from what would otherwise be a destructive influence. We are unable to demonstrate with a microscope the fine 'molecular' or histological variations in the nervous and other systems on which the capacity for hybernation may depend; but some such modifications must exist, and they cannot be regarded as a direct effect of the cold, but must rather be looked upon as arrangements to counteract its influence."

Suppose for the moment that we grant this hypothesis. Then of course heat is the external stimulus which causes the peculiar organisations of those animals that aestivate to respond in such a manner to its stimulus as to produce the phenomenon of aestivation—a term applied to that state of torpidity assumed by certain animals in tropical countries, and extending in their case through the period of greatest heat. Now, I would ask, is cold the external stimulus which induces in certain animals the reaction of their tissues that produces the phenomenon of hybernation? Is heat the external stimulus which induces the reaction known as aestivation? Are there other stimuli which aid cold or heat in producing these reactions? Has selection stepped in and made a much more complete set of stimuli necessary for the production of these phenomena than the Professor appears ready to grant? Presuming that these phenomena enable the animal to escape from "what would otherwise be a destructive influence," is the special reaction of the organism to "cold" or "heat" sufficient to account for the phenomena?

We all know that, long before the period of hybernation commences, long before the stimulus of "cold" can in any way act on the organisation of an animal, other stimuli affect hybernating animals in a very marked manner. Such stimuli cause the animals to eat a quantity of

food enormously in excess of that required for their ordinary needs, in order to prepare them for the long fast which they have to undergo. The ordinary natural cravings of hunger are not sufficient, one would think, to account for this, inasmuch as such animals gorge themselves beyond all possible bounds of repletion. Does heat or some other cause act as the stimulus which causes this gluttony? If so, it is quite clear that this is an essential part of the complex system which leads up to, and, in fact, permits of, successful hibernation. Let us see how far our knowledge of insects enables us to understand this matter, and what facts entomology gives bearing on it. Among butterflies and moths a great number of species hibernate in the imago state. Many of these follow out the usual law of feeding ravenously before their period of hibernation commences. We see thousands of *Gonepteryx rhamni*, and of *Vanessa io*, feeding in the clover and lucerne fields, or on the flowers that clothe our hedgesides during the month of August; but, however warm the weather, these disappear in normal years before or by the time September appears, and, strange to say, the finer and hotter the summer, the earlier do they disappear. Again, *Pyrameis atalanta* may be seen until late autumn, whilst the hops are yet in blossom, and afterwards, until the ivy sheds its bloom, ravenously imbibing the nectar therefrom. Our hibernating moths, too, are well-known as gluttons at ivy bloom, or any other available sweets, before their winter fast begins. But among all our hibernating species the most remarkable perhaps is *Vanessa urticae*. These butterflies emerge from the pupæ in June, and, after a day or two, in the hottest season of the year, a part of almost every brood enters into hibernation. Another part of the brood pairs, and eggs are laid, which in August produce a new brood, that also in part goes into hibernation almost at once, whilst again the other part attempts to perpetuate the species. Natural forces, however, are against the progeny of the insects comprising this latter part, natural forces in autumn and winter are too strong for them, and they are killed off before they come to maturity. It is clear, here, that hibernation is a preservative habit, enabling the insect to escape from what would otherwise prove a sufficiently destructive influence to annihilate it, a condition of things which actually occurs in our country in an allied species—*Pyrameis cardui*—which, however, is often present in countries in which it has been again and again annihilated, owing to its migrating tendencies. It is supposed by many good naturalists, although without any very strong positive proof, that a scarce race of this species has adopted hibernation, and thus maintains its existence continually among us.

But the known peculiarities of *Vanessa urticae*, and the almost equally well-known cases of *Vanessa io* and *Gonepteryx rhamni*, lead me to ask seriously whether "cold" is the external stimulus which, acting on their peculiar organisation, causes the reaction of hibernation. Like the marmot, a large number of our hibernating butterflies and moths do go into hibernation on the approach of cold weather, but to link these together because of this seems to be doing that against which the learned Professor lifts up his voice, *viz.*, assuming without proof that this is the direct consequence of an external influence, simply because the phenomenon and apparent cause occur side by side. Have we ever yet proved a causal connexion between cold and hibernation? I do not think so. Two phenomena may appear side by side, and may

appear to have a causal connexion. Cold and hybernation appear to be such, but what proof is there of the causal connection?

If cold be the external stimulus which, acting on the peculiar organisation of *Pyrameis atalanta*, and on such moths as *Gonepteryx libatrix*, *Orrhodia vaccinii*, *Xylina socia*, *Scopelosoma satellitia*, *Hoporina croceago*, *Dasyampa rubiginea*, *Cidaria miata*, *Hypona rostralis*, *Pterophorus monodactylus*, and many species of *Despressuriæ*, causes them to go into hybernation on the advent of low temperature, is cold to be considered the external stimulus which produces the reaction of hybernation in *Gonepteryx rhamni* and *Vanessa io*, which go into hybernation at a comparatively early and comparatively warm season of the year? If you answer yes, cold is still the stimulus, but the amount of cold necessary to produce the reaction in the organisation of these insects is less than that required in the previous cases, what is to be said of those specimens of *Vanessa urticae*, which go into hybernation in the summer months, and remain torpid from June until March—that is throughout both the hottest and coldest periods of the year? If you say that the hybernation of this species ought rather to be considered æstivation, and that heat is possibly the external influence, I would answer that in those seasons in which three broods emerge in a year, in June, August and October, a certain percentage of each brood goes at once into hybernation, and if we accept the fact that heat is the stimulus which drives the June and August specimens into hybernation, is cold the stimulus which produces the reaction which throws the October specimens into a torpid condition? We may agree with the learned Professor that “we are unable to demonstrate with the microscope the fine ‘molecular’ or histological variations in the nervous and other systems on which the capacity for hybernation may depend,” we may further agree that “such modifications must exist, and that they cannot be regarded as a direct effect of the cold, but must rather be looked upon as arrangements to counteract its influence,” but having granted all this, we would ask again, Is the learned Professor at all sure, what evidence has he that cold is the external influence which directly induces hybernation in very many instances?

I would meet this difficulty by suggesting that the failure of the food supply was the external stimulus which brought about the reaction, but this is open to almost the same objection as cold. True, the failure of the food supply runs side by side with the phenomenon of hybernation, and appears to offer a more closely causal connection even than cold. The moths and *Pyrameis atalanta* do not go into hybernation until the ivy nectar fails; *Vanessa io* and *Gonepteryx rhamni* do not (perhaps cannot) take the ivy sweets for food, and so they disappear when clover and wayside flowers fail to yield sufficient stores. But *Vanessa urticae* again laughs and defies such a connection. It takes on a torpid condition when there is an abundance of food, and remains torpid during a period in which its own brothers and sisters maybe are imbibing their fill.

The hybernation of caterpillars, too, throws some interesting light on the subject. Our tree-feeding kinds which hybernate small, such as those of *Lasiocampa quercifolia*, *Bombyx quercus*, *Apatura iris*, *Limenitis sybilla*, and dozens of others, always hybernate small. Hatching as early as June, July or August, with an abundance of food everywhere around them, they feed up to a certain size, and then, whatever the

temperature, be it high or low, they spin a silken pad, insert the hooks of their prolegs therein, and though surrounded by an abundance of food, remain motionless and torpid alike through the hottest September and the coldest January. Cold here can hardly be the external force or stimulus which acts on the larvæ and produces the reaction of hybernation. Want of food cannot be the cause, for the larva, maybe for the first two or three months of its hybernation, is surrounded with food. Further than that, the same larva will always hibernate in the same skin; if, as occasionally happens, any deviation from this rule occur, the larva will produce an imago under favourable conditions during the autumn, or will die in the attempt. No amount of applied cold will stimulate the larva so that it will bring about the reaction of hybernation once this barrier has been passed.

Are cold and heat, then, the stimuli which, acting on the peculiar organisation of our hybernating or æstivating animals, cause the reaction of hybernation and æstivation? I scarcely think so. At any rate, there can be no doubt that the peculiar forms of torpidity known as hybernation and æstivation are induced in very many instances as a reaction to a stimulus which cannot possibly be either heat or cold.

Although it is quite possible that the failure of the food supply, due itself to the influence of cold, was, in the first instance, the prevailing factor in hybernation, and that natural selection perfected the various species in that stage in which they were best able to withstand the climatic extremes and the absence of food, yet it is very evident that that is not the whole reason now why certain insects hibernate. As I have shown, some insects, both in the larval and imaginal states, do now in some cases hibernate, in spite of an abundance of food, or anything like an extreme condition of temperature to explain the habit; neither is it sufficient to say that it is a habit engendered through long ages by natural selection, without attempting to point out the motive force that causes an insect surrounded by an abundance of food, and by a temperature so far favourable to its continued existence, as proved by the fact that many of the specimens of almost every brood do go through their metamorphoses rapidly and successfully whilst their brothers and sisters are in a lethargic condition, to sleep through the long summer and autumn without stir or motion.

Let us return to a *a priori* considerations again, and look at the matter from another standpoint.

It would appear that just as the chemical affinities of carbon and some other elements admit of the formation of the compounds called organic, and as these possess the capacity, under conditions that we have yet failed to learn, of reacting on one another so as to produce the manifestations that we call life, so all (or nearly all) living matter possesses the capacity of assuming a resting state.

Probably we know nothing of the very earliest forms of life, but some of those that appear to be the most primitive amongst those we do know, appear, on the approach of drought (being aquatic), to encyst themselves, so as to resist dessication, and, on being moistened again, they either wake up unchanged or break up into parts, each part becoming a complete animal. Nevertheless, all the forms in which we observe this may be, after all, the present stage of an evolution that has gone on through many ages. The rotifers, for example, are so highly organised that they must have a long and varied ancestry. This



phenomenon of æstivation, occurring in various districts where prolonged drought occurs, takes place in very highly organised beings with aquatic habits. This would, however, suggest that the resting state is after all more closely related to want of pabulum than to temperature.

If we grant, then, the existence to insects of a capacity to assume a resting state, even for a brief period, it is obvious that this will be assumed whenever the conditions necessary to activity, no matter which of them, are wanting.

At first, any prolongation of the resting stage will be generally fatal; but, since those individuals that possess the power of resting most fully will more abundantly survive, if the period of resting be slightly prolonged, we see how, by natural selection (if so be that adverse conditions gradually become more severe), the rest period may become prolonged, as in hybernation, and how those that feed well beforehand will have the advantage. If we consider the insects of the British Isles, or of temperate regions generally, we find that with very few exceptions they all hibernate at some stage or other, and since the stages at which this occurs are so various, sometimes, even in the same genus or family, it is clear that the tissues of insects are capable, at any stage, of developing that habit of resting, under the necessities of the struggle for existence, into a prolonged rest, probably with considerable rapidity.

In the Lepidoptera, the earlier forms hibernated as larvæ, or we may suppose that the earliest forms were tropical, and did not hibernate; then, as they passed northward (or southward), or as northern (or southern) conditions advanced into their areas, a brief resting period became gradually prolonged into hybernation.

The earliest forms (*Hepialus*, *Cossus*, &c.) being hidden and internal feeders, may have had a rest period in their original (tropical) habitat, but one calculated rather to carry the cycle of metamorphoses, on until suitable weather for emergence occurred, than from any necessity for rest on the part of the larva itself. This would, under the necessary change of environment, form a basis for natural selection to build a hibernating habit upon.

Those families and genera that are exclusively tropical have no doubt been at first purely tropical by accident, and have then had the tendency to hibernate bred out of them, till it became so attenuated that it could not develop rapidly enough when required, and so these forms became permanently confined to tropical regions.

Suppose a form that in the tropics does not hibernate at all, spreading northward to temperate regions. According to varying habits it finds the colder period meets it at different stages—egg, larva, pupa, imago. Let us suppose that its first experience of colder weather is a few inclement days during the imaginal period. This will kill many or make them infertile; but we assume the inclemency not to be so great but that a few survive. Selection then begins and continues until the species (more or less modified, no doubt) has pushed northward to almost glacial conditions, and the imago hibernates say for six months. It is very possible that species have thus gone to and fro from temperate regions to the tropics (or from temperate to tropical conditions) many times, and we may thus account in some instances for the different stages at which different species hibernate.

But there are reasons for supposing that species continuously inhabiting the same climate have varied as to the stage at which they hibernate. It is difficult to suppose that *Arctia*, hibernating as a larva, went to the tropics, gave up hibernating, and came back as *Spilosoma* to hibernate as a pupa and *vice versa*.

When once a species has acquired the hibernating habit, it has acquired it. *Spilosoma menthastri* must hibernate as a pupa, and does so under ordinary conditions, and tries to do so (or perishes in the attempt) under any conditions. It needs no special incentive in temperature, or food, or other external influence, to make it do so. It cannot be prevented from doing so. You can no more make it hibernate as a larva, like *Arctia caia*, than you can make it develop the red underwing of that species. You could conceivably make it do either, only by a rare and exceptional sport, or by a long course of selection.

The alternate broods, when a summer brood does not hibernate, and the winter brood does, give room for much speculation and conjecture, and in these we see that the two forms are, in some instances, most persistently alternate, in spite of variations of environment; in other instances any brood may be the one or the other, according to temperature or other conditions. *A. caia* (*vide* papers *passim*, *Ent. Record*, vols. iv.-v.) has both of these forms, crossed, mixed, and interbred together, so that some larvae in a brood are of the one form and some of the other, in spite of anything, but the mass takes either form, according to temperature. Hibernation, then, is a habit of a species, as much engrained in it (and no more) as any other habit, any marking or other character; it is similarly produced by natural selection, and is subject to variation under changes of condition, in greater or less degrees in different species, just as are any other characters. The need of a resting period selected those that rested best, beginning with small needs and small capacities which developed together, and this whether the need was cold, heat, starvation, drought, &c., but, when developed, the conditions have no closer *causal* connections to each other than they had at first. The conditions continuing, the habit has to be kept in full force; but *they* do not determine it; that is done by the *inherent* conditions developed during many generations.

I have already said that "the adaptation which we find to exist everywhere among organic beings to a very high degree (although such adaptation must of necessity be considered relatively rather than absolutely perfect), proves that the internal forces of the organism have helped to bring about the desired result, but at the same time, only in response to an outside stimulus, which, as it were, determines the lines on which the inherent forces must act." If we assume that temperature (indirectly), and want of food (directly), were the combined outside stimuli which originally produced, in many larvae or imagines, the phenomenon of hibernation, it would be interesting to attempt to examine the internal forces of the insect which were acted upon, and which responded in so large a measure to the outside stimuli as to ensure success.

That the want of food was the main factor in inducing hibernation appears clear, for whereas almost all arboreal and deciduous shrub-feeding larvae, which exist in that stage in temperate regions, throughout the winter, become totally lethargic throughout the winter months,

often, indeed, over a period extending from July to the following February or March, yet those larvæ which feed on the ground on low herbaceous plants or on roots never become thoroughly lethargic, but continue to feed at intervals throughout the whole period of winter in spite of the temperature, whenever, in fact, food is get-at-able and not covered with rime and snow. Usually such larvæ go deep down into the ground at the approach of very severe weather, and come up again afterwards, but larvæ have been known to be frozen quite stiff and solid, so much so that they have been brittle, and yet such will, as soon as thawed, crawl about, go on eating, and come to maturity. This in itself is almost sufficient to prove that extreme cold, *per se*, is an insufficient external stimulus to produce in an insect the phenomenon of hybernation.

At the same time, the physical condition of the organism may have been modified to withstand the low temperature to which the larvæ are exposed, but how far this is potent I am not quite able to see, for, although the modification is, say in an insect like *Arctia caia*, potent up to the fourth skin in which it hibernates, it is impotent beyond, for if the larva change that fourth skin it cannot hibernate but will feed up and become an imago, or die in the attempt.

It would appear, therefore, that "natural selection" has perfected the insect to undergo hybernation at just one particular epoch of its larval life and at no other. May it not be that this specialisation is in the direction of storing up the necessary energy to withstand this long fast, and that when this point of specialisation of the tissues themselves has been reached the larva will hibernate quite independently of temperature, food supply, or any other external factor; or, putting it in another form, we may suppose that the external factor, indeed, is the quantity of food eaten which has been stored, and that at a certain point of development the adaptation of the insect is so perfect that it responds without further stimulus?

With regard to the hibernating butterflies, the phenomenon appears to be explicable upon much the same grounds, but may be here more especially related to the reproductive system. *Vanessas*, which pair the season they emerge, invariably, I believe, attempt to produce another brood of young, and then perish; whilst those which feed without doing so usually pass into hybernation, and go through the duties of paternity and maternity after the winter lethargy.

It appears to me that the influence of temperature, so far as it directly acts on insect life, is relative rather than absolute; for if an insect which has begun to hibernate be artificially exposed to a low temperature for a short time, and then changed to a comparatively high one, the lethargy ceases—the larva seeks for food, and dies if it not be supplied; the pupa becomes an imago; the perfect insect flutters about and is ready to lay her eggs. Nor, once the lethargic tendency be disturbed, will a low temperature reinduce it. The larva and perfect insect, then, when re-awakened, set about the business of their lives, and failing, owing to circumstances, die; and this, in spite of the fact that under natural conditions they would go on hibernating, and that their lethargy would have been prolonged far beyond the time at which, under these artificial conditions, it ceased.

We may assume, of course, as I have before suggested, that cold was the external stimulus which originally developed the resting habit

that we know as hybernation, in as much as it limited the food supply, and rendered a period of inactivity in the tissues absolutely necessary ; that its direct action was scarcely the active factor is certain, because those insects which can get food all the winter do not hybernate. Similarly, aestivation is probably the indirect effect of heat. Animals that can get food during the hottest part of the year do not aestivate, but those that live in water, which is likely to be dried up, and which frequently is dried up at the hottest period of the year, have adopted by means of natural selection, a resting habit which helps them to combat the absence of food, and thus prevent their extermination. It is the cold and drought, however, which simply prevent them getting food. Hybernation and aestivation appear, therefore, to be simply reactions, which enable the animals hybernating or aestivating to meet the lack of food, the latter being the direct determining factor, although its absence is primarily occasioned by cold or heat.

---

### A Few Remarks on the Lepidoptera of Tenerife.

By SYDNEY E. CROMPTON, F.E.S.

The existing information about the lepidopterous fauna of the Canary Islands is either buried in large and antiquated tomes, such as the *Histoire Naturelle des Iles Canaries*, of Messrs. Webb and Berthelot, published in 1836-50, at Paris, or is scattered among isolated papers and pamphlets in foreign languages, and in the *Transactions* of various learned societies at home and abroad. Bory St. Vincent's *Essai sur les Isles Fortunées* (Paris, 1805) contains only a mere list of butterflies and moths. Our most recent and most scientific authority on the Rhopalocera and Heterocera of the Canary Islands is Dr. Rebel, whose two brochures on the subject, published about a year ago, are simply invaluable. But to an English lady belongs the merit of having written the first modern treatise on the moths and butterflies of Tenerife. Mrs. Holt-White's little volume, dealing in a popular manner with the Lepidoptera of Tenerife, opened up the way for other students, and has done much to turn the attention of entomologists to the Canaries, not only as a health resort in winter, but also as a place where, though the insect fauna is limited, the species to be found present many characteristics of extreme interest to the philosophical biologist, who studies them from a Darwinian standpoint, as aids to solving the secret of that "far-off divine event towards which the whole creation moves." To this fact I, as a resident in Tenerife, can testify, that since the publication of Mrs. Holt-White's handbook there has been a breaking out of an entomological rash on the face of Canarian society, no less conspicuous than astonishing. Throughout the last season in Puerto Orotava (the fashionable side of the island of Tenerife) I was surprised to notice the numbers of visitors who sported butterfly nets and killing bottles. Some were to my knowledge earnest, scientific, and systematic lepidopterologists ; but many were merely pursuing their scale-winged victims (probably ignorant of their scale-wingedness !) simply from a dilettante inclination, or as a relief to the ennui and lassitude of Orotavian existence, to which all visitors fall a prey who come to the islands without some study or hobby with which to occupy themselves in the intervals of social gatherings and pleasures.

Certainly a large percentage of the visitors this year might be seen taking their before-time aimless constitutional along the main road leading from the Grand Hotel, armed with green gauze nets, that had the tell-tale shape and stiffness betraying their recent acquirement from the dealers. Not only were these well-meaning individuals armed with this customary engine of warfare against the butterflies, but they usually saw fit to load themselves with a complete cargo of entomological apparatus; and I have often smiled to myself on meeting some plethoric old gentleman or grey-ringed old lady simply hung over with cyanide bottles and pin-cushions, pill-boxes and forceps, lenses and larva-tins, and all the other impedimenta that an entomologically-inclined tourist could collect together. My own life at this time became somewhat of a burden to me, for during my visit to Orotava in the spring, when the young collector's fancy lightly turns to thoughts of butterflies, I used to be pestered by visitors in the hotel consulting me on various matters that caused them perplexity in their new study. On one occasion it was a fat old matron, who waylaid me on the stairs of the hotel as I was coming down to dinner. Laying a plump detaining hand upon my arm, she made the polite request that I would lend her "pins—real butterfly pins—to pin my captures with. I have used up *all* my darning needles"—this last as a plaintive appeal to my sympathy and compassionate pity. Poor lady, pity did indeed largely enter into the feeling with which, later in the evening, I regarded her collection. The result of two weeks' assiduous pursuit consisted of some 30 or 40 butterflies and moths, mutilated and worn specimens mostly, with wings set all awry at various angles, and (O shade of Doubleday!) a darning needle the size and thickness of a hedge-stake impaling the *head*, and another needle stuck through the *abdomen* of a *Chrysophanus phloeas*.

On another occasion it was a nice old gentleman, all bald head and heavy gold watch chain, who had been bitten by the mania for collecting. He rushed at me in the hall one day, in great excitement, and begged me to go to his room to view his caterpillars. "Larvæ, I should say, sir, larvæ; they all perspire and then die." So I went with him to examine into this strange larval sweating sickness. When I did see his "breeding cage" (save the mark!), I was not surprised. He had eight or nine larvæ of *Deilephila euphorbiae* tightly bottled in a small medicine bottle, along with a few withered leaves of the euphorbia plant. I am afraid I was a little outspoken in my remarks, forgetting for the moment that he was an old man and I a young one, but it really beat me how anyone of his age and presumable intelligence could expect caterpillars to live and thrive in such a receptacle—a tightly-corked medicine bottle, reeking still of its original contents, not even then entirely dispensed, for I saw some drops of mixture, paregoric or cough-easer, in the bottom of the bottle. From the bruised appearance of the caterpillars I concluded that they had, like the medicine, been well shaken, not before however, but after taken. I pointed out to him that larvæ of *D. euphorbiae* were not at all easy to rear in captivity, and that they needed plenty of fresh air and sunlight, and earth at the bottom of the breeding cage, in which to pupate, as they were a subterranean species.

But it is not the purpose of this paper to recount the extraordinary blunders of amateur entomologists who visit the Canaries, though many amusing reminiscences crowd upon me.

There are thirty species of Rhopalocera at present known to occur in the Canaries. I append a list\* of them, and should like to offer a few remarks concerning the list in a subsequent paper.

### HESPERIDES

*Thymelicus christi*

### PAPILIONIDES

#### LYCAENIDA

#### LYCAENIDAE

##### LYCÆNINÆ

*Lycaena boetica*

„ *webbiana*

„ *lysimon*

„ *aestiva*

*Chrysophanus phloeas*

*Thecla rubi*

#### PAPILIONIDA

#### PIERIDAE

##### APORINÆ

*Aporia crataegi*

##### PIERINÆ

*Pieris cheiranthi*

„ *wollastoni*

„ *rapae*

„ *daphidice*

##### RHODOCERINÆ

*Gonepteryx cleobule*

*Colias edusa* and var. *helice*

##### ANTHOCARINÆ

*Euchloë charlonia*

### NYMPHALIDAE

##### NYMPHALINÆ

*Vanessidi*

*Pyrameis atalanta*

„ *cardui*

„ *virginiensis* (huntera)

*Argynnidi*

*Argynnis maia*

„ *latona*

##### SATYRINÆ

*Satyrus xiphioides*

*Epinephele ianira* & var. *hispulla*

*Hipparchia statilinus*

##### EUPLEGINÆ

*Anosia archippus*

*Danaüs chrysippus*

„ *alcippoides*

„ *dorippus* var. *klugii*

## CURRENT NOTES.

Mr. Percy H. Grimshaw, F.E.S., describes (*Ann. Scot. Nat. Hist.*, July) a species of Bot-Fly (*Cephenomyia rufibarbis*), which is new to Britain, and which is parasitic upon the Red Deer (*Cervus elaphus*). Two specimens (both females) were captured by Mr. L. W. Hinxman, at Strath Carron, in Ross-shire, in June and July, 1894. A very graphic account of the life history of the fly follows the description. From May to July the adult females, which are viviparous, may be seen flying slowly and noiselessly in vertical circles round the heads of their victims, who become greatly disturbed, and begin to snort and kick. "Suddenly a fly darts down upon the open nostril of the restless animal, soon flying up again, only to repeat this irritating process several times. The poor victim becomes still more excited, and tries to scratch its nose with its hind feet, or endeavours to rub this organ, which is sometimes already bleeding, upon its fore feet, all the while sneezing violently, and occasionally by this means succeeding in dashing its little enemy down to the ground. In the meantime the fly has succeeded in injecting into the nostril a drop of fluid containing minute, living and very active maggots. These adhere firmly by means of the hooks with which they are provided, and by constant wriggling work themselves continually onward until they come to lie

\* We have arranged these in accordance with Dr. Chapman's scheme of classification (*Ent. Rec.*, vol. vi., p. 150).—ED.

at the back of the throat, where they remain until almost ready to enter the pupal stage. They are then forcibly ejected from the throat by the coughing and sneezing of their host. . . . They pupate on the earth in dark places at the base of walls or under leaves, becoming pupæ from half a day to two days after leaving the throat of the deer. The pupal stage lasts from twenty-one to forty days, in colder weather much longer."

Dr. A. S. Packard, in the course of a paper, "On a rational nomenclature of the veins of insects, especially those of Lepidoptera" (*Psyche*, May), makes the following remarks on the structure of the vein, or, as we call it, nervure:—"The structure of a complete vein is described by Spuler. In a cross-section of a Noctuid (*Tryphaena pronuba*), the chitinous walls are seen to consist of two layers, an outer and inner, which takes a stain and lies next to the hypodermis. In the cavity of the vein is the trachea, which shows more or less distinctly the so-called spiral thread; within the cavity are also Semper's rib and blood corpuscles, which proves that the blood circulates in the veins of the completely formed wing, though this does not apply to all Lepidoptera with hard mature wings. I have been able to observe the same structure in sections of the wing of *Zygaena*."

Mr. G. C. Davis, of the Agricultural College, Michigan, in an article entitled "A few points in collecting *Ichneumonidae*" (*Canad. Ent.*, June), states that by trampling down a few of the bushes in some spot on the edge of the thicket, where one wishes to collect, many rare species may be obtained. "As an Ichneumonid comes along, it will almost invariably make a slight halt over or near the trampled vegetation. The halt, though hardly noticeable, is sufficient for one to scoop the specimen with the net. . . . The why of this method is probably explained by the fact that the bruised plants give off a similar odour to what they would were they eaten by some caterpillar, and the parasite halts to look for the cause of the odour."

Mr. R. H. Meade, of Bradford, mentions (*Naturalist*, July), that he captured at Grange-over-Sands, during the first week of April, 1895, two rare species of Diptera. One of these, *Melanostoma barbifrons*, was a Syrphid, the other, *Phorbia muscaria*, was a Muscid. Concerning the former, he says:—"One was a little so-called wasp fly, of which I had never before seen an indigenous example, and which I believe has not been previously recorded as British. This little shining black species about three lines in length, has the ♂ characterised by the forehead being bearded with long black hairs. . . . The abdomen is marked by four small, oblong, yellowish-white spots. . . . The ♀s were black and very glabrous, without the hairy forehead, and with the abdominal spots absent or very indistinct."

## VARIATION.

A DARK MALE OF *SPILOSOMA MENTHASTRI*.—I, this noon, between 12 and 1, found a pair of *S. menthastri*, in cop., on a stalk of *Erysimum alliaria*. The ♀ is of the normal hue with the abdomen slightly suffused with black. The male has the thorax entirely smoky-black, and the ground colour of both fore and hind wings is smoky-black with

darker spots. I have never seen or heard of such a remarkable variety before.—ENDYMION PORTER, JUNR., Easthill, near Frome. *June 20th, 1895.* [A number similar to this were recorded as having been bred at Elgin last year.—ED.]

## NOTES ON COLLECTING, Etc.

NOTES FROM THE BOOKS OF THE EXCHANGE BASKETS.—Mr. T. Maddison (Durham) writes on April 24th: "It is very difficult indeed to say why some insects vary so much. I have bred from the same batch of ova every form of *Taeniocampa instabilis*, from very pale and mottled forms to black; so, from the same batch of ova, I have bred a long series of very variable *Hypsipetes sordidata*, ranging from green to black; again, from eggs of *Polia chi* I have bred from the type to very dark var. *olivacea*. Why this should be I have never seen any complete explanation, and probably there is none. They seem to me to vary in appearance without any absolute law. *Abraxas grossulariata* and *Arctia caia* will vary enormously; in fact, of the former there will scarcely be two specimens of a long bred series exactly alike, though all may have received exactly the same food and general treatment. Even from the same batch of eggs, laid on the same day, there is great difference in almost any common kind of larvæ: some grow rapidly, others lag behind; some seem weakly from their birth, whilst others grow rapidly and strongly to pupation. The earliest spring moths here this year — *Hybernia marginaria*, *Phigalia pendaria*, and *H. leucophaearia*—all appeared on Feb. 27th, but none of them were at all abundant. It is here a very late season; one of my boys during the past two days has taken over 100 larvæ of *A. caia* (a species which he breeds assiduously every year), and many of them were very small, evidently just up from their winter quarters. By the way, can anyone tell me what is the best way to deal with hibernating larvæ? With NOCTUIDES such as *N. c-nigrum*, *Tryphaena ianthina*, &c., sleeved out in the open, I have had very fair success, but quite the reverse with *Arctia villica*, *A. caia*, *Bombyx rubi*, and other BOMBYCIDES. Whether kept indoors or out of doors, I fancy they all want a certain amount of feeding, even in winter, whenever the weather is moderately open."—Dr. Gunning (Montrose) writes on May 2nd: "Insects seem to be very numerous this spring. My first trip, on March 28rd, resulted in 12 pupæ of *Acronycta (Viminia) euphorbiae*, and several larvæ of *Spilosoma fuliginosa* and *A. caia*. *Panolis piniperda* first appeared on April 5th. Sallows have been working splendidly. We use a spread of four sheets, 12 feet by 10 feet, which gives us 480 square feet, so that poor *Taeniocampa gothica* and *T. stabilis* get very little chance of escaping. All the *T. gothica* are beautiful varieties. The only thing I have to add is that *Pachnobia rubricosa*, which was so abundant last spring, is very scarce this season."—Mr. W. M. Christy (Emsworth) writes on May 7th: "As to hibernating larvæ, Geometers, at least those that I have tried, will remain sitting on the twigs inside the sleeves all the winter, and do well. *Zygaenidae* will do well if removed from their food altogether and placed in a dry receptacle among bits of cork, &c., and I am told that if left on their growing food plant they mostly die.



*Bombyx rubi* I try to breed annually, and with invariable unsuccess. I have had them out of doors, indoors, in a cold place, and in a greenhouse. I very much doubt whether they do feed at all, either in the winter or in the spring. I always bring a lot away from Scotland in October, and have got a lot now. If they do any better than usual I will report it. I had a few *Spilosoma fuliginosa* among them, and one or two of these have pupated since the winter. *Dasychira fascelina* I hibernated this winter. They were kept under cover in a bag among dead leaves. They were alive, and I sleeved them out in March. I fear there is no rule about hibernating larvæ, and also that what one would think to be the most natural way of keeping them is not always the best."—Mr. S. Walker (York) writes: "The season is up to the average here; the cold winds of the last few days, however, have left their mark on the trees pretty plainly everywhere. I find larvæ very plentiful. I got a nice lot of *T. populeti*, about half grown, yesterday, with a sprinkling of *Plastenis subtusa*, whilst *Cleoceris viminalis* was in extreme abundance on sallows."—Mr. A. Adie Dalglish (Glasgow) writes on May 20th: "I spent a fortnight at Luss in July, 1898, and collected principally in the glens there, and the mention of the best of my captures will show, I think, that the locality is, from an entomological point of view, as well as from its picturesque beauty, quite worthy of a visit. *Erebia aethiops* can be taken by the river side, at the junction of Luss Glen and Glen Striddle, whilst *Coremia munitata* and *Emmelesia minorata* can also be taken commonly at the same spot. *Nudaria mundana* occurred in some numbers on a wall half way up the glen. *Hepialus hectus* was common in the woods near the quarry, whilst *H. sylvinus* occurred all over the hillsides. *Larentia caesiata* could be taken in hundreds on the rocks on Beinn Dubh; *Lycophotia strigula* (*Agrotis porphyrea*), *Pyrausta purpuralis* and *Herbula cespitalis* on the heather on the lower slopes of the same hill. I took a fine series of *Geometra papilionaria* (18 in all) principally near the village. *Emmelesia affinitata*, *E. alchemillata*, *Eupithecia absynthiata*, *E. rectangulata*, *Venusia cambrica*, *Larentia olivata*, *Crocallis elinguaris*, *Boarmia gemmaria*, *Coremia unidentaria*, *C. designata*, *Cidaria truncata*, *C. prunata*, *C. pyraliata*, etc., occur in numbers in or near the village. *Melanthia bicolorata*, of which I took a lovely series of the var. *plumbata*, occurs everywhere. Sugar was a complete failure; a number of *Xylophasia polyodon* var. *infusata* put in their appearance, as well as single specimens of *Dyschorista suspecta* and *Cymatophora duplaris*, and several *Noctua brunnea*, *Hydroecia nictitans* and *Apamea gemina*, etc. *Plusia chrysitis*, *P. iota*, and *P. pulchra* came to thistles; *Charaas graminis* to ragwort; whilst *Scopula lutealis*, *Scoparia ambigualis*, *S. cembrae*, *Grapholitha nisana* and *Dictyopteryx lorquiniana* (*uliginosana*) (both variable) could be taken from the oaks and birches (? Ed.) in the quarries. But as I only collect in the evening when away on my holidays (Sundays excepted), being occupied in sketching all day, I can scarcely be expected to work a locality thoroughly. With regard to *Scopula deorepitis*, which I rediscovered at Lochgoilhead some four years ago (after it had apparently been forgotten) and put a number of collectors on their mettle, it occurs from Kilmun to Lochgoilhead, oftenest in damp places near the shore, and will usually be seen sunning itself, its wings stretched fully out on the brackens. *Phibalapteryx lapidata* flies on grassy

moorlands, I believe, all over the West of Scotland, at the height of about 1,000 feet. I obtained it last October, near Lanark, where I took about fifty in half-an-hour, as it only flies for about that period, from 5.30 to 6 p.m. There are three localities known for it near Kinloch-Rannock, where I understand it flies later in the evening, and has to be sought for by the aid of a lamp. Another locality is near Stirling. I obtained ova from a fine female that I took last autumn. They were round, flattish, and of a pale green colour when deposited, but unfortunately, they have proved infertile. *Eupithecia helveticata*, another uncommon insect from this locality, I discovered on the junipers on the banks of the Allander, at Milngavie, about ten miles from Glasgow, three years ago, towards the end of September, and I have bred it yearly since then. The larva is of a raw transparent green colour, with dark lines on the back and sides, and pale subdorsal and lateral lines; the head varies from pale green to a dark greenish purple. W. F. Kirby, in Berge's *Schmetterlingsbuch*, mentions that the larva of the var. *arceuthata* has a purple head; but it would be utterly impossible to divide a brood of larvæ and say these have green heads and the others purple. The larva does not descend from the plant to pupate, but spins a slight cocoon in the thickest part of the plant. This it does also in the wild state, as last year I beat out half-a-dozen pupæ when searching for the larva.—Mr. Sydney Webb (Dover) writes on May 27th: "I am sorry to think that there is a possibility of *Acontia luctuosa* being improved out of its Devon habitat, as it has been from Caterham Valley, where it formerly swarmed, and from Greenhithe, whence it has probably disappeared for many years, but where, 30 years ago, it was extremely abundant. Can Mr. Dobree Fox tell us anything about Devonian *Papilio machaon*? I know they are captured to the number of three or four nearly every year. Has the ground been salted and the insects now endeavouring to hold their own, or is it a dwindled-down natural locality? If put down, naturalists would, I am sure, avoid taking specimens, in order to give the species a better chance of establishing a domicile there, but the fact should be duly recorded, otherwise the individual attempting the acclimatisation deserves tar and feathers—at least, 'them's my sentiments.'"—Mr. T. Maddison (Durham) writes on May 29th: "Forres is a small country town, lies low, and is very uninteresting. Not far away is an ordinary wood with a river running through it, and in the woodland paths and on the river banks Salvage took some years ago the extraordinary number of *Tryphaena subsequa*, which has made Forres famous. Very few have been taken since. A mile or two out of the town are the Altyre Woods. Here amongst the dwarf birches *Endromis versicolor* occurs—not however in any numbers. Reid and I, in July, 1891, spent two days in searching for larvæ of this insect—a weary and toilsome work—and we got about 20 each—not much in the way of sport. There was nothing else in the wood just then except a few *Acidalia fumata* and a very few "micros." Some four or five miles away are a lot of rolling sand dunes (I forget the name of the place), where we spent another day most unprofitably. I got three macros—all common Geometers—and Reid got a few common "micros." Nice forms of *Dianthoecia capsicola* and *D. conspersa* (both ochreous) are bred from seed heads of lychnis. *Retinia resinana* and *B. duplana* are taken early in the year. The curious pupæ (inside a round

resinous mass) of the former are common on the small firs. *Phibalapteryx lapidata* occurs (sometimes freely) in the Black Wood at Rannock; it is taken flying along the sides of the paths after dusk. I have had ova, but failed with the larvæ."—Mr. John Finlay (Morpeth) writes on June 7th: "*Tortrix icterana*, in this locality, frequents damp places where the herbage is coarse and rank, and after 4 p.m. the insect rises out from amongst the herbage as one is moving through it; but about seven in the evening it is most plentiful on the wing, and is very easily captured. The time for its appearance is the end of June. *T. viburniana* frequents moors here where *Erica* is the principal herbage; the species flies in the sun, and, if the weather be favourable, the insect will be on the wing by 10 a.m.; it does not fly so freely in the afternoon. The species is much more plentiful than *T. icterana* in this neighbourhood. The larvæ of *Peronea autumnana* and *P. tristana* I collect in rolled up leaves of dwarf willow at the end of July or beginning of August. I do not think that the male *Cheimatobia brumata* carries the female, nor do I think that the male of any species of moth carries the female."—Mr. H. W. Vivian (London) writes on June 11th: "Insects were just beginning to turn up when I left Wales, ten days or a fortnight ago, but nothing wonderful. I paid a visit to some rough fields where I knew *Melitaea aurinia* should be, and found them right enough, but unfortunately mostly worn. Nothing else of note occurred there. Sugar, by the sand hills, on one night produced a good crop of *A. exclamations*, *Grammesia trigrammica*, et hoc genus omne, the more aristocratic visitors were, one *A. ripae* and half-a-dozen *Leucania littoralis*; this species was just coming out, I think. Two years ago I got them in plenty, earlier than this, by dabbing the sugar on the clumps of marram grass; the moths were often difficult to see, as they got right into the middle of the clump, and it was very sticky work getting them out. The only other insects at sugar in the same place were *Mamestra albicollon*, which were not uncommon. A little earlier I was out one evening with Mr. Holland, of Reading, and we found *L. littoralis* larvæ swarming, we might have gathered buckets full; with them were a few *A. praecox* larvæ, looking very handsome and conspicuous. I bred very few, as *L. littoralis* makes very short work of muslin, and they were mostly gone by the next morning. I have done little else this year; willows were over so quickly that I got hardly anything on them. A hunt for *Xylina furcifera (conformis)* was unsuccessful for the fifth year in succession. I know of no specimen taken since the one I took in 1889, I think. Happily the Welsh specimens are smaller and much darker than the Continental, and so may be easily distinguished."—Rev. C. F. Thornehill (Whitchurch, Salop) writes on June 17th: "The larvæ of *Eriogaster lanestris* seem unusually abundant this year. I find them, however, very chary of pupating. Can any one give me any hints on this point? I can get the moths to emerge from the pupa without any trouble, by just putting the cage containing the cocoons in the sun early in March, when they will come swarming out like flies. I once had 15 out in this way in about half an hour. My experience of the season so far has not been very satisfactory. Sugar, as yet, has been a miserable failure, owing, I suppose, to the cold bright nights. I tried it four times and took four moths, after which I knocked off till the weather changed. Nearly all my captures of

NOCTUIDES have been at rhododendron flowers, which seem, while they last, to be very attractive to the Hadenas as well as to sundry other species; but I have seen no *Choerocampa porcellus*, although I have kept my eyes open for them. Larvæ of all kinds seem very plentiful—the very dry May having, doubtless, suited their development—and the apple trees in particular have suffered severely: the top shoots of the hawthorn hedges, too, have in some places been stripped to an unusual extent by the queer-coloured larvæ of *Diloba caeruleocephala*, of which I could have taken many hundreds.”—Mr. H. A. Beadle (Keswick) writes on June 18th: “I have just got a nice lot of *Erebia epiphron* var. *cassiope* and *Crambus ericellus*, with a few *Mixodia schultzeana*, and a sprinkling of other nice things. There were plenty of common things out, but I had neither time nor space for them. I have taken two insects new to this district. One of them is *Phibalapteryx vittata*, of which I took about 50 good specimens in one evening. The *C. ericellus* are very fine specimens this year, and rather more plentiful, whilst I only got one *C. furcatellus*, and that a rubbed one. Micros of many species were numerous. My dark vars. of *Hypsipetes sordidata* are all taken flying over bilberry; all that I have taken of the ordinary colour and markings are got from willows; hence, in this case, I think food must be the cause of the variation. I once found a small hollow amongst the ling on Scout Fell, near Kendal, which was swarming with this species, the specimens ranging from nearly white to dark brown, some with and some without a central white band on the fore-wing, but not one had any trace of green, and very few shewed the round white spot on the anal angle of the fore-wing. I have not tried sugar yet, but intend giving my pet place a trial very soon.”

QUERY.—CRANE-FLIES FROM AQUATIC PUPÆ.—I have recently found a number of Crane-flies emerging from aquatic pupæ, and should be glad to be informed whether there is a known variety of this insect that is aquatic in any of its stages. I am unable to find any local authority for the fact.—H. W. H. DARLSTON, 109, Leonard Road, Handsworth, Birmingham. June, 1895.

## NOTICES AND REVIEWS.

### Rambles in Alpine Valleys, by J. W. Tutt, F.E.S.

[Published by Swan Sonnenschein & Co., Paternoster Square. Price 3s. 6d.]

In his new volume, Mr. Tutt breaks entirely new ground. He quits (perhaps a little regretfully) his well-beloved Kentish woods and marshes, wanders far afield, and finds a new entomological El Dorado on the Italian slopes of the Mont Blanc ridge. This step, everyone who reads the book will acknowledge to have been a happy one. These essays are no mere catalogue of a rustling bustling tour over half the States and Principalities of Europe, in which historic scenes are visited *à la carte*, and a pre-determined number of cathedrals and battlefields viewed in a week. On the contrary, they provide what is far rarer, and, to the contemplative beings who take their supreme delight in observing Nature's lowlier marvels, far more deeply interesting, records of the rambles and impressions of a worshipper of nature, preaching his creed to his fellows in belief, noting his impressions after the happy toil of exploring quiet glades, finding hidden beauties, unearthing the

secrets of the rock and glacier, and withal constantly marking the inconspicuous butterfly and the lowly moth.

From a delineation of some marvellous gem of Alpine landscape, Mr. Tutt glides quietly off in a discursive manner deep into the question of the protective uses of the spots on the underside of a *Lycænid* or *Fritillary*, and then returns to a word-picture of the rock-strewn glacier, the sullen peaks, the rushing torrent, the grassy flower-bedizened alps, and the mountain-ensconsed lakes. Again he descends swiftly from a description of the morning sun casting his dazzling light on the lower slopes of Mont Chetif, and stoops to touch upon the pigmy warfare of a pugnacious Copper and an equally quarrelsome Blue struggling and wrestling unnecessarily over the superabundant nectar of a beautiful flower.

What matters it, however, if the scientific discussions do break a little the continuity and homogeneity of the literary style—are not these digressions really characteristic? and what, after all, is a book without the distinctive mark of the mind of the author deeply impressed upon every page?

There are four chapters, each dealing with a separate Alpine Valley. The first is occupied with that of the Dora; the second with the Val de Chapy, in the direction of Mont Cormet; the next with the Val Ferrex; and the last describes the Val Vénî and the great Glacier de Brenva. This fourth chapter, too, contains a charming essay, tracing out carefully the probable operative causes of the distribution, and the lines which this distribution followed of the various great families of forest trees, the ceaseless struggle betwixt pine and palm under alternative periods of glacial cold and tropical heat, which is a volume in itself, and which, even to those readers who are not ardent botanists, will be perused with the most vivid interest.

The work is replete with lessons, warning us of the narrowness, the comparative uselessness of an exclusive study of our insular fauna, and our author manfully strives to awaken in us a desire for knowledge of European species, particularly those closely allied to British forms, and endeavours to give us wider and truer ideas of entomology. We see *Chrysophanus virgaureae*, not as a battered weather-stained exhausted wanderer, ruthlessly hunted down and captured on our own South Coast, but in all his new-born beauty, battling with his compeers on his native alp. *Pamphila lineola*, too, is met with, not however on a tidal salt marsh, but high up amongst the rocks on mountain sides.

Perhaps one of the most interesting passages to readers of the *Record* will be the disquisition on the various species of *Colias* inhabiting the Alpine region, and we must quote a portion of this:

"Four species of clouded yellow butterflies then have their homes in the valley and on the mountain slopes here, each with its own peculiar and particular range, yet each overlapping the others to a considerable extent. The richly clad Clouded Yellow (*C. edusa*), in its garb of brilliant orange, with a deep black brown border, haunts the flower-strewn fields in the lower valleys, and does not intrude upon the mountain sides, where, amidst the wild flowers, which carpet the sunny hollows among the lower region of pine and larch, the Pale Clouded Yellow sails along at a terrific pace, staying occasionally to toy around a favourite flower, sometimes even to suck its sweets, or

to make love to a lady butterfly robed in palest saffron hue, or even in bridal white. High up the mountains he occasionally sails, a few seconds sufficing to take him up the one, two, or three thousand feet over which we bipeds have to spend some hours. But the flowery banks along the lower levels of the pine woods are the Pale Clouded Yellow's chosen haunts.

"Upon the breezy mountain sides, where, as we have seen *C. hyale* sometimes roams, the paler *Colias palaeno* is to be found, never by any chance, it seems, does the latter come below the pines; on the contrary, it usually remains above them, or at their higher levels, but on the exposed mountain tops it makes its way successfully against the stiffest breeze, and is now and then found fighting with a specimen of its still paler relative (*C. phicomone*), which, with its white or creamy coat dusted thickly all over with grey, appears to be the beau ideal of a butterfly for the Alpine heights. No altitude appears too great for the latter, no breeze too powerful. It sails along by the side of the glacier, over the snow, or across the upland pastures. It also has a powerful flight, and occasionally comes down for a short distance into the valley, but its visits there appear to be rare indeed. Now and again a male *C. hyale* may be seen chasing his rival back, as it were, to its own domain, or toying with a lady not of his own race, and unsuccessfully attempting to win her love.

"This fine Alpine *C. phicomone* is an interesting species, for it is probably one of the oldest existing forms of this lovely genus. The male sometimes shows a tendency to assume a warmer tinted coat, and dresses himself in yellow, but over this yellow coat he is always well sprinkled with grey, and there is consequently about him a look of hoary age. Very thickly sprinkled indeed are the grey scales, threatening even occasionally to hide the brighter garb beneath. The ladies, however, are always pale, not with a clear white complexion, but with a washed out pallid hue, which is intensified by the greyiness that encroaches upon, or rather envelops it; or may it not rather be that the grey dress is the true one, and that the paler parts are attempts to relieve and enliven the duller ground colour? Males and females, too, have pale spots in the dark border surrounding the wings, which is so characteristic of this group, breaking it up, in fact, so much, that it almost ceases to be a border at all.

"Now examine, carefully, one of the warmer tinted males, that we referred to just now. Suppose that its coating of grey were lifted up, leaving only the brighter yellow hue beneath, and that the border containing the spots were a little more conspicuous and distinct, and we have *C. hyale*. There is no greater difference in their general appearance than this, all the characters of the one are repeated in the other, and the differences are really so small and insignificant, that, probably, if we observe the insects closely, we may be able to discover why these differences have been brought into existence."

Then, after a description of the clear coloured yellow male, and the pale creamy-white female of *C. hyale*, Mr. Tutt continues:—

"The undersides of the two (*phicomone* and *hyale*) are almost identical, though they are somewhat brighter in *C. hyale*. We have seen how well the yellow of the latter corresponds with the bright yellow flowers of the trefoil or hieracium, that the insect loves so well; but where the Alpine species (*phicomone*) loves most to roam,

high up on the mountains, trefoils and hieraciums, although still abundant, are dwarfed and less conspicuous. It is from these dwarf thistles, and flowers that rise but a few inches above the ground, that it obtains its supply of nectar, and if it be on the wing when the sun disappears, a sudden drop among the herbage, or upon the rock, is the usual result. How inconspicuous it then becomes, with its dark grey coat, for the underside of its wings is dull, with grey scales, as is the upper side. How much more complete a protection does this afford than would the more brilliant colour of its relative of the lower levels."

The references, too, to that strangely allied family of moths, the Burnets, are deeply engrossing.

First Mr. Tutt finds one (*Zygaena transalpina*) "with deep blue fore-wings of exquisite tint, having six bright scarlet spots arranged in three pairs on each of the wings; the hind wings are of the same bright scarlet colour, with a narrow margin of the beautiful blue of the fore-wings. Identical in shape, in spotting, and in general appearance, with the common Six-spotted Burnet moth (*Zygaena filipendulae*) of our British hill-slopes, there is yet a difference, scarcely definable in words, unless it be a bluer tint to the ground colour, a slightly different shade in the scarlet, and a dim trace of a dark shade round the scarlet spots of the fore-wings, which makes them abundantly easy to separate."

The next is "larger than the one we have just mentioned. Its colour is usually green, only occasionally being blue. Its antennæ also are longer, and their tips more pointed, and there are only five scarlet spots on each fore-wing, arranged in two pairs with a solitary spot near the outer margin. This individual a great deal resembles our British Broad-bordered Five-spotted Burnet (*Z. trifolii*), although, to a trained eye, the difference in the shape of the wings, and in the antennæ suggests that there is in reality a greater distance between the two than between the two six-spotted forms which we were comparing just now. Of their relationship, however, there can be no doubt, and closet naturalists have maintained that they are only varieties of one species."

The third Burnet is similar to the last, but has traces of a sixth spot, especially on the underside. Next comes *Z. minos*. Then *Z. achilleae*, whose spots are situated in the usual positions, but the outer pair are joined into a blotch, as in *Z. minos*, but "very rarely are the other spots connected to form the longitudinal blotches found in the latter species. As we look over a large number of specimens we soon find that here and there a specimen has one or two of the blotches of *minos* well developed. No specimen, however, has all three blotches, and the basal and central pair of spots are usually distinct. This then, is a species in a transition state between the spotted Burnets and the streaked Burnets; on the way to form a purely spotted species, perhaps, if the blotched be the older forms; on the way to form a blotched species if the spotted be older. The ground colour of the fore-wing varies with the sex, those of the gentlemen being green, those of the ladies being of a bronzy hue, sometimes even golden." Lastly, for yet another species is obtained, comes a noble *Zygaena*, differing vastly from the others, "with grand creamy rings surrounding the five red spots on the fore-wings, whilst in addition to the usual spots, a narrow transverse red band with a creamy border runs parallel to the outer

margin of the wing; this latter feature is probably a survival from the time when the spots formed a band, and were not restricted as now. First one specimen interests us, and then another; but when perhaps a couple of hundred have been examined, we are somewhat puzzled. In some the creamy rings occupy almost the whole of the wing outside the red spots; in others, scarcely a trace of the cream colour is left, whilst the outside narrow red band is the only clue to show you that it is anything but an ordinary five or six-spotted Burnet moth. At last a specimen is picked up in which the outer band is represented only by a few red scales, and in this particular form the species is exceedingly like the first species we noticed (*Z. transalpina*). This lovely cream-ringed insect is called *Z. carniolica*, after the locality from whence it was first recorded. Different, then, as *Z. carniolica* is at first sight from all the other Burnet moths found here, an examination of a sufficient number of specimens shows that the difference is only superficial, and that a real relationship exists between this variable and beautiful species and the others." But I am afraid we must now bid "adios" to the Burnets, puzzling and bewildering as their specific relations are.

Amongst many interesting notes and speculations concerning insects other than lepidopterous, one short study in particular, which is worthy of the most careful attention, is that relating to the varying habits and methods of respiration of aquatic insects; whilst an observation of the methods by which the pouch is formed and attached to the abdomen of the female of *l'arnassius apollo* will be keenly appreciated by those whose attention is centred in the principal order of insects, so far as entomologists in this country, at any rate, are concerned, the Lepidoptera.

But it is impossible within the limits of this notice to even mention a tithe of the subjects which are touched upon.

And after reading slowly, gently on, perusing each page, until at last the end is reached, we allow our book to slip from our hands, and conjure up in our imagination, nurtured and stimulated by these vivid descriptions, some distant dim idea of the appearance of these enormous mountain ridges, foaming swirling streams, flower-strewn meadows and dark-mantling pine woods, but how unutterably far these day dreams of loveliness fall short of the matchless original can only be truly known and understood by one who has dreamed the dreams, and then beheld the glorious reality; and perhaps it is well that this is so, that those who are denied the privilege of gazing on such wonders, should not comprehend the full truth of such dazzling wealth of form and colour, but should possess their souls in peace, unconsumed by the ardent yet lingering desire of climbing over the slopes and dwelling on the scenes portrayed.

"Rambles in Alpine Valleys" is indeed a dainty volume, tastefully bound, well printed on excellent stout paper, with charming photographic illustrations, and sketch map of the routes, and lastly with a carefully arranged index which is itself quite a special feature.—A. F. BAYNE.

---

## SOCIETIES.

At the meeting of the NORTH LONDON NATURAL HISTORY SOCIETY, on June 18th, Mr. Battley gave some account of his captures at Chattenden,



on Whit Monday and the following Saturday. The following were the most important: *Sesia culiciformis*, *Erastria fasciana*, *Acontia luctuosa*, *Aspilates strigillaria*, *Scoria lineata*, *Epione dolobraria*, *Eucosmia undulata*, and the larva of *Thecla w-album*. Mr. Smith reported large takes of *Amphidasys betularia* by "assembling" at Winchmore Hill, by Messrs. Ogden and James. Miss Prout read a paper entitled "Notes on the genus *Bryophila*." She considered the genus a very natural one, having no close allies, containing the only lichen-feeding Noctuides. There are only four reputed British species; of these, one (*Bryophila algae*) is a very doubtful native, whilst another (*B. impar*) is considered by many authorities, and notably by Mr. Tutt, in his *British Noctuae*, to be a variety of *B. muralis*. Miss Prout suggested that it might be the inland form of that species. She then proceeded to deal with *Bryophila perla* and *B. muralis* in detail. The eggs, which in both species are white at first, are laid about August or September, those of *B. muralis* being apparently laid a little later than those of *B. perla*. The larvæ hatch in a fortnight or three weeks, but go into hibernation while still very small, beginning to feed again in the early spring. Miss Prout narrated her own experiences with them at some length, and said she had lately succeeded in rearing a specimen of *B. perla*. Both species are taken sparingly at sugar, but the best way of finding them is by searching walls in the early morning. The larvæ feed only on damp lichens; in the very dry season of 1893 *B. muralis* was very rare, and *B. perla* scarcer than usual. The latter is very widely distributed, but *B. muralis* is practically confined to a few seaside localities; var. *impar* is exclusively confined to the neighbourhood of Cambridge. Both species are very variable. Mr. Nicholson agreed with Miss Prout that the species only feed on certain species of lichen, and are therefore only found on certain walls on which their particular food-plants grow. He had taken *B. perla* freely at Cromer last year on walls, all of which faced in a southerly direction. Mr. R. W. Robbins had found a good series of *B. perla* on the waterworks wall near the Lea, and said that the insect was still seen there occasionally in considerable numbers. Mr. Battley had found a number of the larvæ at the end of May and beginning of June, at Sandown, but had failed to rear any of them. He had also found the pupæ commonly under the sea-wall at Brighton, and had found *B. muralis* at Brighton and Ilfracombe, on slaty cliffs.—On June 22nd, 1895, the Society made an excursion to Boxhill. Messrs. Prout, L. J. Tremayne, Nicholson and Bacot, and Misses Nicholson and J. C. Robinson, reached Boxhill about 10.47 a.m. They immediately made for the hill, and soon discovered that it was teeming with insect life, though the majority of the Lepidoptera consisted of grass "Micros." However, amongst these Mr. Tremayne soon discovered a specimen of *Acidalia ornata*, which he promptly netted. Immediately afterwards Mr. Prout captured a specimen of *Setina irrorella*, and the species was subsequently found to occur all over the open spaces of the hill. Several more specimens of *A. ornata* were taken during the morning, and the larvæ of *Cucullia verbasci* occurred in some numbers on the mulleins. The members lunched on the top of the hill, and afterwards worked a chalk-pit on one of the slopes. Here some lovely male specimens of *Pamphila sylvanus* were found flying in the sunshine, and one or two specimens of *Lycaena*

*icarus* were seen. The members then walked into Dorking, where they were joined by Mr. R. W. Robbins, who had been to Leith Hill, but had taken nothing of note, and by Mr. Smith, who had covered pretty well the same ground as the main body, and had taken *S. irrorella*, but no *A. ornata*. Immediately after tea all the party returned home with the exception of Messrs. Smith and Tremayne, who stayed for dusk, but were only rewarded by *Cidaria fulvata* and *Hepialus hectus*. The only butterfly at all common throughout the day was *Coenonympha pamphilus*.—At the meeting on June 27th, Mr. Rose exhibited *Nemeophila plantaginis* and *Zonosoma annulata*, taken at Chattenden, at Whitsuntide. Mr. Bacot reported the capture during the past week of *Bryophila perla* on the waterworks wall near the Lea; also that sugar had proved a failure at Hale End. Several members had had the same experience with sugar in their districts.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY, May 7th, 1895.—Exhibits:—Dr. Sequeira: a specimen of *Hadena trifolii* (*chenopodii*) lately taken on a fence at Twickenham; also eggs laid by the same. Mr. May: *Taeniocampa gracilis* from Tooting Bec Common, which had been taken at salallows, between April 18th and 22nd; one of the specimens had the orbicular stigma on the right fore-wing developed into a horizontal reniform marking; another had the transverse row of black dots, unusually large and distinct. Mr. May also stated that he had taken a male *Notodonta carmelita* at Weybridge, on May 4th. Dr. Buckell stated that he had recently had an opportunity of comparing the newly-hatched larvæ of *Pachnobia rubricosa* and *P. leucographa* with those of *Taeniocampa instabilis* and *T. populeti*. The former were hairy, the latter smooth. The former, when at rest, bent the anterior segments round, and resembled somewhat a note of interrogation; the latter rested stretched out at full length. He thought that those entomologists who, in past times, had placed *rubricosa* and *leucographa* in the genus *Taeniocampa* could not have been familiar with the newly-hatched larvæ. Mr. Battley said that it would be interesting to observe whether the development of the imago within the pupa in *Pachnobia* took place in the autumn, as is the case with *Taeniocampa*. [It does so. Ed.] May 21st, 1895.—Exhibits:—Mr. Clark: three specimens of *Amphidasys strataria* from Epping Forest, bred by Mr. Lane; one of them was of a very pale ochre-grey colour, with the usual markings mapped out in a slightly darker shade. Mr. Gates: a series of *Lithocolletis lantanella*, bred from leaf rubbish collected from the ground. Mr. Bate: young larvæ of *Spilosoma mendica* which had passed the winter as ova (? Ed.). Mr. Prout: a variety of *T. munda*, resembling some of the dark mottled forms of *T. instabilis*, from Broxbourne; also an asymmetrical *T. populeti* from Epping Forest; the latter had the orbicular stigma on the left fore-wing, much enlarged and of a very irregular shape. Mr. Bacot: a series of *Cidaria suffumata*, bred from Aberdeen eggs; they were all of the ordinary form, although said to be the produce of a female of the var. *piceata*. Rev. C. R. N. Burrows: a case of *Epichnopteryx reticella*, the sole result of a whole day's work on the sea-wall at Benfleet. Mr. May stated that a male *S. lubricipeda* had paired with two females, both of which had laid fertile eggs. Mr. Bate read a paper entitled "Notes on *Amphidasys betularia*," which will appear at length in our next number.

### Obituary.

THE RIGHT HON. THOMAS HENRY HUXLEY,  
LL.D., Ph.D., D.C.L., M.D., F.R.S., &c.

Born May 1st, 1825.

Died June 29th, 1895.

Another of the earliest teachers of the scientific doctrine of the evolution of organic beings has passed away in the person of Professor Huxley. Lyell, Darwin, Tyndall, Helmholtz have all pre-deceased him, and of the great expounders of the doctrine of evolution in its earliest days only Wallace and Spencer are left. When one considers how few of our religious teachers accepted the doctrine of evolution in the early days, we cannot help feeling satisfaction that the last religious rites were performed by Mr. Llewellyn Davies, one of the first to accept the principles of the doctrine of evolution.

At this time we can hardly recognise the difficulty of the position occupied by the earliest philosophical biologists. Brought up in the creed of the fixity, the immutability of species, Darwin's *Origin of Species* gave them the clue to a logical conception which had until then remained a mystery, inexplicable, inscrutable. At this time Huxley held the professional chair of palæontology, and lecturer on natural history in the Royal School of Mines. His preliminary training, as well as his inherent capacity for probing into the mysteries of relationships and their significance, made him one of the very first to accept generally the Darwinian theory of descent, and from this time he became a greater exponent of the facts involved than his master, pushing the theory to its logical conclusion, and showing none of the hesitation which Darwin himself showed, although the latter's halting action was perhaps necessary and led persons to weigh carefully a theory which almost everyone regarded with prejudice. Huxley's lectures "On the relations of man to the lower animals" pushed the matter forward, and hastened the time when the principle of evolution became a fixed part of the biologist's creed, a result which would have come about much more slowly had it not been for the position Huxley took with regard to it; and settled in the mind of almost every thoughtful biologist the fact that whatever assumptions in the *Origin of Species* might be disproved, whatever supposed facts should be proved erroneous, yet the theory of the evolution of organic life would never, in its broad lines, be shaken.

Huxley was a born fighter, a keen controversialist, and undoubtedly a perfect idealist. His position with regard to the religious question on the first School Board for London is sufficient proof of this. Nothing is more painful than to listen to a narrow-minded bigot to-day, or to hear his animadversions on the impossibility of reconciling a belief in the broad facts of evolution (and even in its details) with a fine idealism. The life of Professor Huxley, and those of many other of our leading men, prove the absolute possibility. No one felt more than he "the sense of an open secret which man cannot penetrate," and "in which lies the essence of all religion." His scientific position was sound and dominant; he looked upon "scepticism as the highest duty," and upon "blind faith as an unpardonable sin." That is the position of the scientific world of to-day; no teacher has done more to inculcate the lesson than Thomas Henry Huxley, by whose death the world has lost one of its greatest men.

# The Entomologist's Record

## AND

### JOURNAL OF VARIATION.

---

VOL. VII. No. 2.

OCTOBER 15TH, 1895.

---

#### LYING FALLOW.

By REV. G. M. A. HEWETT, M.A.

I wonder whether it is possible to blush in print. Probably some will say that a liberal use of red ink will accomplish that result; but at any rate I think that I can prove that red ink does not necessarily imply a blush, for under no circumstances can I conceive that the composers of the rubrics in our Prayer Book were blushing when they composed those blameless productions. Nor again does it seem to me that the presence of a blush compels the wearer of the same to transfer the ruddy colour to pen and paper, for I have never heard that Betsy wastes a penny of her hardly-earned wages on red ink when she writes to William to signify her consent to his request for a Sunday walk. As to that hardened old villain, Barkis, I don't believe he blushed, and he certainly was not such a fool as to commit his "willingness" to paper. But even if the colour had risen under his weather-beaten cuticle, and even if it had seemed fitting to him to write his brief and well-known message, I cannot think that some museum would now have possessed that priceless document, well writ in red. However, I am open to conviction, if any of my readers can bring forward strong enough arguments to the contrary.

Perhaps the simplest and neatest way, after all, is to proclaim to the world in honest black that I am conscious of a slight heightening of colour in writing this confession that I am taking a year's rest, or rather, not so much that I am idling from entomology, for I am sure that others have done the same, as that I am glorying in the fact, and inclined to advocate it as a wise principle. Of course, I can quote plenty of precedent. The devil will always supply that. In classical times, "Apollo did not always keep his bow strung," and the youngest student of English History is aware of the fact that for a brief period we rested from Royalty and became a Commonwealth. Again, a good farmer will give his land a rest; in fact, in these evil days, some land gets more rest than it needs, so Irish landlords say, and the hungriest of autumn larvæ are liable to hybernate, as we know to our sorrow. But after all, Apollo went back with joy to his archery, England welcomed the Restoration with a joy that was so unrestrained as to be sometimes barely decent, land is again going to feel the harrow and bear shekels under the soothing guidance of a Conservative Government

(the Opposition may read those words in an ironical sense), and sometimes a few hybernating larvæ wake up to the joys of spring cabbage. And so I hope that I, too, shall find my way back to my old pastures with renewed appetite.

It is a wonderful thing how the appetite does grow with resting. Some sage says that it grows with eating. How his household bills must have mounted up! He may be right, but he cannot blind me to the fact that mine grows daily with enforced abstinence. Even as the Israelites hungered for the flesh pots of Egypt while sojourning in the wilderness, so do I, in the barren desert of town lodgings, hunger after the larva pots and ready supply of food of my old country chateau, St. Winefride. No less strange, too, is the fact that all my friends, in a year when I find myself practically unable to breed, have, with one consent, knowing nothing of my change of circumstances, offered me ova and larvæ of insects which I have been longing in vain to breed during the past five years. I suppose that I am only undergoing what many entomologists face bravely enough as their yearly lot, from which they produce excellent results. Perhaps if I knew that it was to be my yearly lot, and perhaps if I had not just come out of circumstances so perfect, I might manage well enough. But I am rather in the condition of the few larvæ which I did try to breed early in the year, brought out of a land flowing with—well—dock and chickweed—into a very small pot with a little groundsel which was always getting too dry to eat, and sadly in want of fresh air. And so I have given it up, and really (here's where the blush comes in) rather enjoy it for a while. I do find a good deal of pleasure in having time to chew the cud of my past labours. The entomologist in full work seems to me to lack leisure and power of contemplation. He is always on the chase. He sees an insect and rushes at it with a net, without daring to allow himself to pause to admire its grace and beauty, for fear lest it should carry off its grace and beauty out of his reach.

Never until this year have I been able to watch *Sibylla* and the Fritillaries, in the rides at Lyndhurst, from a cosy seat opposite a cluster of bramble blossom, without feeling driven to catch a few for a friend in the North, who was pining for an underside or two, or without hurrying off with a beating tray, to try for *Ridens* and *Prodromaria*. I am not sure that I have not thereby learned another lesson, that one sees more insects by not hurrying after them. It may of course be only the innate cussedness of circumstances. At any rate, I never saw so many *Valesina*, nor have I seen *Aglaia* at Lyndhurst for eight years, until this year found me netless, and just loafing about on a day when several fluttered past me. This may be a logical explanation of what has always been a thorn in my side, namely, that if there does happen to be an insect which I want particularly, some boy beginner is sure to pick it up. He loafs about in no hurry and sees it, while I am always in keen pursuit of something else.

Again, a year's watching and ruminating brings with it many pleasures of the imagination, which one touch of the collector would have destroyed. Geometers fly out of the hedgerows, which a stroke of the net would proclaim worthless, whereas now they flit along, unknown possibilities, perhaps—or why not *probably*—priceless varieties—even new and unknown species, a joy to the observer. What if they are only *Didymata*? I cannot see their markings, so let

them be the new *Larentia tuttiata*. *Noctuae* brush against your cheek in the woods, as you stroll home in the evening, or hover round the geraniums in the garden. Here, again, a touch of sugar on a tree, or a candle in a window, would have brought sorrow and a feeling that things are not as they should be, with the capture of *Festiva*—Southern type—or *Gamma*—which knows no touch of variation. Now, again, I recognise the merit of my contemporaries, by watching in the woods my newly-discovered *Noctua chapmani*, or bestow a slight tribute to my own excellence by boxing in imagination *Plusia H*—. Why not a single English letter for a name just as well as the Greek gamma? Spell it “aitch,” or call it “*H. longum*,” if you want to bring it up to date with modern synonymy. Anyone may discover a new *Plusia* nowadays, so I will be modest, and give my own initial to that, and reserve the much more noteworthy discoveries of a new *Larentia* and a new *Noctua* to bear the names of my great contemporaries.

Well, sir, the blush is fading from my cheeks as my emancipated imagination soars on the wings of discovery, and breathing is difficult in such high latitudes. So let me stay my flight towards the regions where such bright constellations move and shine and flutter to earth again, to recover my wind and live in hopes, not that I may lure others to follow my base example, but that I may rise refreshed another year and find it a good one, and pursue my way.

---

## NOTES ON AMPHIDASYS BETULARIA. \*

By DOUGLAS C. BATE.

Although in the few notes which I have strung together I make no claim to have given an exhaustive life history of this moth, I do claim that what I say will have the merit of being accurate as far as it goes. Although, without doubt, a really complete account of any one insect from the egg to the perfect form is of great value, yet few men, who have their business to attend to, have sufficient time to make the close and continuous observation necessary for such a purpose; I trust, therefore, that the few remarks I now make may be found worthy of being regarded as a slight contribution to the knowledge of this common Lepidopteron. The study of the Lepidoptera is my relaxation, but the business of making both ends meet—or one end meat and the other bread—prevents my devoting as much time to it as a scientific study as I could wish; still I venture to believe that what I do undertake is to record what I see—no more, no less. I have repeatedly bred insects from the egg, and have kept up continued observations on successive generations of them; but I frankly admit that I have never previously undertaken to tell other people—people who doubtless know a great deal more about the matter than myself—all about it; I feel, therefore, somewhat like the boy who undertook to instruct his maternal ancestor in the correct method of extracting the contents of the ovum of the gallinaceous fowl by suction. But to proceed to my subject. On the 6th of May, 1893, I received from my father a pair of *A. betularia*, which he had found in *copula* outside a window of his house at Brixton. He gave them to me in a match-box, and they were therefore in rather a

---

\* A Paper read before the City of London Entomological Society, May 21st, 1895.

ragged state; still, as the Adam and Eve of other generations, I have brought their battered bodies up to-night in a box to show you. Whether the female had laid most of her eggs before she came into my possession, or not, I do not know; anyway she gave me only 16, of which 15 hatched, 14 pupated, and 13 emerged as perfect insects. I made few if any observations on this brood of larvæ, but before the perfect insects came out in the following spring I had determined to do my best to continue the breed, and note results. The larvæ were fed on lime, and the pupæ were kept indoors during the winter. The first imago, a male, put in an appearance on March 10th, 1894; another, likewise a male, came out next day; these were the Cain and Abel of my moth family; a female appeared on the 18th, three more females on April 8th, and the last of the batch turned up a few days after—my business taking me much from home, I am unable to say exactly on what day. I was most unlucky in getting them to pair. When a male came out there was no female, and *vice versa*, and it was not until the 12th and 18th insects emerged, which they did nearly together and fortunately proved to be male and female, that I succeeded in obtaining fertile eggs; these were laid on April 19th, and hatched on the 11th and 12th of May. There were a considerable number of them, over 500; the bulk of them were laid at night, or rather, I think, in the early morning, as I could see very few up to 11 p.m. on the 18th, and found a large quantity at 8 a.m. on the 19th; they were of a dull light green when laid, a good deal lighter and a little larger than those of *Biston hirtaria*, oval in shape, with longitudinal grooves; they were stuck to the lino cover of the box, most of them being a little raised at one end, but many quite on their sides. They soon began to show a depression in one side, and by the 12th or 18th day looked very shrivelled, and by the 14th day I fancied I could detect a dark spot in each, but the alteration in colour was very slight until a day or two before they hatched, when they became quite leaden in hue. The larva ate its way out near the end of the egg, but I did not observe that it made much of a meal off the shell, contenting itself with gnawing its way out and immediately walking off; it was extremely active, getting along at a great rate. In colour it was almost black, and with a pocket lens I could see no sign of lumps or bumps of any kind, but I observed that the head was not notched. At the slightest jar the young larvæ let themselves drop by a thread. They were divided into two lots, one placed on lime and the other on plum leaves, but did not appear to eat anything for some hours after they were hatched, when they settled down to business. Those on plum did not do at all well, and fully three-fourths died within the first week, but those on lime did well. Was this because their parents had been fed on the same food during their larval state? They shed their first skin in about four days, the other moults taking place at intervals of seven to eight days. The notch in the head did not begin to appear until the third moult, when, however, it was very slight, but became more and more marked at each moult. The larva spun a few threads before shedding its skin, and attached itself to them by its prolegs, bent its body into the form of a note of interrogation, and remained quiescent for several hours. I was unfortunate in not being able to catch a single individual in the act of taking off its overcoat, but I saw many in the early morning hours, which, from their bleached appear-

ance, particularly about the head, I imagined had just got through the process. It was rather singular that I seldom saw an empty skin, and I fancy, although I admit I never saw it done, that the larvæ eats it, more particularly as the skins I did find looked very incomplete, the head end being usually missing. Very early in life, after the third moult, a difference of colour was observed, some few of those fed on lime becoming green, whilst the bulk were of various shades of brown. I isolated each green larva as soon as I found it, but in almost every case the next change was back again to brown. Those fed on plum showed a greater tendency to turn green, and several of them remained green all through, and I watched with interest for the resulting moths to see if any difference could be detected between them and their brown brothers and sisters, but beyond the fact that six out of seven were females I discovered nothing. They began to pupate in the first week of July, and the last had gone by the end of the month. They were provided with soft soil mixed with cocoanut fibre, but a large number did not attempt to go underneath. I regarded this as rather fortunate, for it enabled me to observe that pupation did not take place for several days after they ceased feeding. They did not appear to occupy any particular position whilst awaiting the change. Some remained doubled up head and tail together, others assumed the form of the Greek  $\Omega$  whilst others remained almost straight; all, however, became gradually shorter and thicker. As far as I could make out they did not all go through the same number of skin moults. I believe some moulted seven times, others eight, and others again nine times, and I suggest that as the females are larger than the males, and usually, although not always, the larvæ which changed oftenest were the largest, it is possible that the females habitually change their skins oftener than the males. This conclusion is, however, to a certain extent, upset by the fact that one or two larvæ which without doubt made nine sheddings of skin, were very small, and, although I am not sure, I think they produced male moths. The box, a large American cheese box (which by the bye I find very convenient in which to breed insects if the top be knocked out, leaving a ring which serves to strain a piece of lino over the bottom part of the box) was again kept indoors in a room which seldom has a fire in it, and I fully expected to have to wait until this spring before I should see anything of the perfect insects; it was, therefore, with some surprise that I found a moth out in September, and all through the autumn and winter they continued to emerge at intervals. I regret to have to confess that I have no exact dates for these early birds, as I was continually away from home, and only found them out by chance. I have three set, but the bulk of them I had not time to attend to. This doubtless shows a sad lack of scientific zeal, but, on the other hand, it shows that business had to come before pleasure with me. I have arranged in the box all the set insects under their food plants, and with dates. It is unfortunate that most of the lime-fed insects came out crippled, especially in the hind wings, and this I attribute to the fact that the damping was more irregular in the box in which they were kept as pupæ. They had nothing but earth, whilst the plum pupæ were dug up and put on moss, which kept damp for a longer period. The set insects show eight males and four females fed on plum, and three males and four females fed on lime. The bulk of the plum-fed larvæ produced males; on the other hand there were more females



amongst the lime-fed ones. Those pupæ which were formed on the surface of the ground produced more perfect insects than those which had gone under, a very large number of moths, which had partially emerged, being found when I cleared out the box last week, and a number of pupæ, although apparently alive, have not yet produced imagines. Males, as a rule, came out first and females later, and this caused a difficulty in pairing, as the males were usually dead before a female appeared. My endeavour to breed is the cause of so few insects being set, as after a few days their appearance was the reverse of good, and they were too much knocked about to be worth setting. In March, Mr. Bacot gave me several females of *A. strataria*, which I hoped to cross, but no male *A. betularia* came out whilst they were alive. *A. betularia* females rarely lay eggs unless they have been fertilised, but *A. strataria* almost invariably lays, as far as I can see, whether fertile or not. I noted a singular difference between the two species in their manner of depositing eggs. *A. strataria* seems always to place them in the folds of the lino and under the seams, but *A. betularia* scatters them about the surface indifferently. The eggs of *A. strataria* are greener than those of *A. betularia*, but this may be owing to their being infertile. The ovipositor of *A. strataria* is longer than that of *A. betularia*, but I noted that whilst both these species deposited their eggs on the inside of the lino, and with the body but little bent, *Biston hirtaria* pushed its eggs through the meshes and into corners and splits in the wood, whilst it also bent the body completely round, so that the ovipositor was brought round between the legs, and sometimes almost level with the head. A great many insects appear to have stated times of the day for coming out of the pupa. Thus I have searched closely for *A. strataria* at Epping Forest, but never found it before 4 p.m., when it was always in perfect condition; *A. betularia* seems to come out a little later, as I have never but twice seen it emerging before 5 p.m., and on both occasions when it was found earlier, viz., in the morning, it was crippled, and from the look of things had been struggling for hours to get rid of the pupa case. I feel that my observations have been very imperfect, and that probably I have greatly wasted your time in narrating them. I should not have undertaken to do so had I known that my time would have been so fully occupied in other ways, or that I should have been so much from home, or finally, that I should have such bad luck in getting the perfect insects out; but such as they are you have my notes before you, and I can only hope that they may have been of some interest to you. My prime object in feeding my larvæ on different sorts of food was to see if any difference could be detected in the perfect insects, either in colour or sex, the single observation that plum feeding produced most males, and lime the contrary, proves little, and requires further looking into, but as regards colour no difference could be detected, as the males are usually darker than the females. That the variety *doubledayaria* is becoming commoner in the North of England is, I think, without doubt. At Delamere Forest, I hear, it is taken oftener than the type, and it also seems certain that all insects caught in the Manchester district are darker than the southern type. I never collected in that district, but I lately saw a specimen of *Hybernica marginaria* sitting on a fence near Eccles, which I promptly boxed, as it appeared to me to be darker than usual, and I have brought it up

to-night for exhibition. I never saw var. *doubledayaria* alive, and therefore I fear that like the memorable and exhaustive book on Iceland, in which an extended heading for a chapter was made, "On the Owls of Iceland," the chapter consisting of the one laconic sentence, "There are no owls in Iceland," as far as I am concerned I can only say: I know nothing about *doubledayaria*. Harking back to the question of sex, as influenced by food, I would suggest that the reason why more females were bred from lime, is that the leaves of that tree are more succulent and more easily masticated by the larva, which consequently is better fed. The production of queen bees seems to depend largely on the grub getting more nourishing food than the worker larva, and the production of female newts and frogs is likewise, I understand, greatly influenced by the supply of food obtained by the tadpole—semi-starvation producing males, and the addition of meat extract to the water producing females, whilst in extreme cases, where the tadpoles were kept in filtered water, they did not develop at all. It therefore seems reasonable that something of this sort acted in the case of *betularia* when fed on lime instead of plum.\*

---

\* We would call the attention of our correspondent to the fact that a lepidopterous larva, when newly hatched, has the generative organs (of course, at this time, very imperfectly developed) distinctly male or female, and that, therefore, it is impossible to influence the sex of lepidoptera by any course of feeding that the larva may undergo.—ED.

---

## On the Development of Sex in Social Insects. \*

By J. W. TUTT, F.E.S.

I have, in a previous article (*Ent. Rec.*; Vol. vi., pp. 181—182), alluded to the Weismannian theory of "intrasélection," viz., that just as there is a struggle for survival among the individuals of a race, in which the fittest are victorious, so there is also, among the living particles which make up the tissues and organs of each individual, a similar struggle with a similar result. Weismann further considers that structures which are undergoing modification—i.e., "adaptive structures"—are not themselves transmitted, but only the "quality of the material from which intra-selection forms these structures anew in every individual life."

It has been necessary to assume some theoretical position with regard to the structure of compound bodies, and hence the smallest conceivable particles of which living tissue is composed have been variously named "gemmules" by Darwin, "biophors" by Weismann. Peculiarities of these biophors, Weismann tells us, are transmitted, and may "become more and more favourable and adaptive in the course of generations if they are subject to natural selection." These peculiarities as to sensitiveness in certain directions are inherited, but the special direction which the particular growth takes in consequence of this inherited sensitiveness is not inherited, but must be acquired anew, so Weismann considers, in every individual life. "The great significance of intra-selection, appears to me," he says, "not to

---

\* Part of a Paper read before the Lancashire and Cheshire Entomological Society, Jan. 13th, 1895. [For previous part, see *Ent. Rec.*, Vol vi., pp 181-188].

depend on its producing structures that are directly transmissible—it cannot do that—but rather consists in its causing a development of the germ-structure acquired by the selection of individuals, which will be suitable to varying conditions. Intra-selection effects the special adaptation of the tissues to special conditions of development in each individual."

Weismann further points out that the increased development of certain organs or parts is of necessity accompanied by secondary modifications in other organs or parts connected therewith. Instancing the increased strength of the skull, muscles and ligaments of the neck, contemporaneously with the increased growth and weight of a deer's antlers, he does not think it at all necessary that all the parts concerned should simultaneously adapt themselves *by variation of the germ*, to the increase in size of the antlers, because in "each separate individual the necessary adaptation will be temporarily accomplished by intra-selection under the trophic influence of functional stimulus." It is a little difficult to follow this; for if modification of these tissues once sets in, even as a result of intra-selection, as suggested by the Professor, one fails to understand why the peculiar qualities of these structures should not, according to his own view, be transmitted with the peculiar qualities which result in the production of the enlarged antlers. He further suggests that the "discord among parts may sometimes be such that intra-selection is not able to produce harmony . . . . but that the secondary adaptations would probably, as a rule, keep pace with primary variations," and that in "the course of generations, by the constant selection of those germs, the primary constituents of which are best suited to one another, the greatest possible degree of harmony may be reached"; further, that "the mingling of the moieties of parental germ-plasm in fertilisation must be of the utmost importance in this connection, for they secure the constant presence of an abundance of very varied combinations of primary constituents," whilst "a complete harmony of the primary constituents can therefore never exist in the germ-plasm of sexually produced individuals; for this germ-plasm is always composed of two individually distinct halves . . . . and it follows that in every act of fertilisation very different primary constituents of corresponding parts, derived from both father and mother, must meet in the germ . . . . the primary constituents of their germ substance could not be united together to produce a young organism, exhibiting harmony in its various parts, if they did not all have a certain scope for variation, so as to render them capable of adaptation to one another." One other statement must be considered, *viz.*, that "the supposition of the whole activity of intra-selection presupposes the specific sensitiveness of the various primary constituents, and of the units of smaller or larger groups of these, and this sensitiveness can naturally only have arisen through ordinary selection of individuals owing to the variation of the germ."

Having considered these general principles bearing on intra-selection, Weismann argues that the "differentiation of sex can also, within certain limits, be regarded from a similar point of view." In dealing with this part of his subject, Weismann selects, among others, the social insects—ants, wasps, bees and termites—in which, as all my hearers are aware, sex is somewhat complicated, and in which there

are fertile females (queens), sterile females (workers), and males (drones). Assuming that the primary constituents for the characters of both sexes are included in the same egg, Weismann considers that "in many instances it appears that a stimulus decides as to which group of them shall undergo development—whether the male or the female."

It is generally accepted, on the strength of the experiments of Siebold and Leuckart, that in bees and wasps fertilised eggs develop into females, whilst unfertilised eggs develop into males. No real explanation has, I believe, hitherto been given as to how this occurs; Weismann, however, accepts the fact, and points out its utility, inasmuch as the queen can produce male or female offspring according to necessity; he then goes on to say "we can understand why the sex has here been made to depend on an external impulse," although he strongly disagrees with the conclusions that the "stimulus is the efficient cause of the male or female character of the embryo," and warns his readers against mistaking in other less apparent cases the stimulus, for the *causa efficiens* of the development, illustrating his contention by the consideration of the neuters or workers of state-forming insects—bees, ants and termites—which (workers), as well as the males and females, originate from one kind of egg, the non-fertilisation determining the production of the male, a bountiful supply of nutritious food or the reverse, giving rise respectively to the development of a queen or a worker from a fertilised egg.

The essential difference between the queens and workers is the fertility of the former, the sterility (more or less absolute) of the latter. It has generally been assumed that the quality of the food is the direct cause of the difference, but although the bees have it in their power by means of food-supply to cause a larva to become either a queen or a worker, yet Weismann does not look upon the poor feeding as the real *causa efficiens* in producing sterility in the latter, but merely as "the stimulus which not only results in the formation of rudimentary ovaries, but at the same time calls forth all the other distinctive characters of the workers." He considers it, therefore, doubly incorrect to look upon the poor nourishment as the cause of the sterility, (1) because it confuses the stimulus with the real cause, (2) because it fails to distinguish between an organ that has become rudimentary and one imperfectly developed. Weismann's contention that the ovaries of the workers "are actually rudimentary," and not simply imperfectly developed is, in spite of the reiteration, difficult to understand, considering that the workers do sometimes lay eggs. It seems to be imperfect development all round—the number of egg-tubes are reduced from about 200 (in the queen bee) to from two to six (in the worker), and it is quite beside the question to say that "no matter how rich the food may be, no more egg-tubes can be formed in the imaginal state." One knows that structures in insects do not grow or become developed when they have reached the imaginal condition; already formed structures may, in some instances, become matured, but to suppose that rich nourishment in the imago stage can increase the number of egg-tubes, or otherwise that we must consider the ovaries rudimentary and not imperfectly developed, seems illogical and unreasonable. The proof that certain fly-maggots (*Musca vomitoria*), sparingly fed, produced an abundance of eggs, and the conclusion that "in spite of the

scanty supplies of food during larval life, the organs of reproduction, or at any rate their essential parts—the ovaries—were normally constituted, so that with good nutrition during the imago stage these flies reproduced in a perfectly normal manner,” appear to us a mere assumption, for what proof has the learned Professor that there had not been in certain directions imperfect development of the ovaries, which only required a *series* of experiments in the same direction on each successive generation, to show how far such imperfections had proceeded. The case of social insects is not at all parallel, for the habit has undoubtedly been inbred into these insects for countless generations, and hence the cases in no wise resemble each other; and when the Professor goes on to assert that “by comparing the result of this experiment with the known facts as to bees, the difference in the behaviour of the two organisms is made clear. In the case of bees, a distinct degeneration of the ovaries and various accessory organs of reproduction takes place, in consequence of poor nourishment; while in flies the whole reproductive apparatus is formed quite as perfectly when the nourishment of the larva is deficient as when it is ample,” we would like to ask on what grounds the Professor makes this last assertion? If it be on the experiment he describes with *Musca vomitoria*, then we must say that for a scientific man he is very easily satisfied. Unless we are ready to grant the Professor this assumption, his next statement that “meagreness of nutrition is a mode of reaction characteristic of bees,” that “it is a new acquisition, and was not possessed by the ancestors of these insects,” falls to the ground, and as we believe that “meagreness of nutrition” does produce general imperfect development in all insects, and base this assertion on observations made in breeding, among others, many thousands of butterflies and moths, we can only allow the Professor the assertion for what it is worth. Ill-fed moths, for example, are small, and they lay a less number of almost or quite normally sized eggs, as a rule, and not the same number of smaller eggs; a fact which strongly suggests rather a reduction in the number of oviducts than a corresponding reduction in the size of those still left (*Vide, Ent. Record.* v., 138).

Emery recently gave it as his opinion that the degeneration of the ovaries of the workers was simply due to an increased sensitiveness of the germ-plasm to poor nutriment, and explains the formation of neuters as consequent upon an altered mode of reaction in this direction in the germ-plasm. To meet the theory that “natural selection” has undoubtedly inbred a tendency in the ovaries of these insects to be more easily affected by defective nutrition than are the ovaries of other insects, Professor Weismann asserts that the ovary of the workers is “not only in an undeveloped condition, but is actually rudimentary: the majority of the typical parts are wanting.” What does this assertion mean? We know that workers do sometimes lay eggs; therefore, at least, the essential parts are not wanting, and if we accept the Professor's statement that the ovarian tubes are reduced in number from about 200 down to six, surely it is not to be expected that the secondary structures connected with the ovarian ducts will retain their most highly developed characters, for I take it that the ovum is the primary essential structure, the ducts, receptaculum seminis, &c., being secondary to the formation of the oval cells them-

selves. It seems to be quibbling with the facts to insist that the palpable failure to develop, which is exhibited, shall not be called "an undeveloped condition," but that the structures shall be called "rudimentary," and to build up assertions thereon, and when it is stated that if "it be assumed that the number of ovarian tubes has increased in the queen since the caste of workers arose, there can nevertheless be no doubt that at the same time it has diminished greatly in the case of the workers," the Professor appears to give his own precarious position away, because he assumes a gradual development in one direction, a gradual failure in the opposite direction, yet, although he is willing to grant that the former is a more highly developed condition of the ovary, he is not satisfied with calling the latter an imperfect condition, but must insist, for the sake of the theoretical superstructure, that the ovary is rudimentary, and his further statement, that Adlerz discovered that the degree of diminution in the number of egg-tubes differs in the workers of various species of ants, appears only to enhance the position that it is a slowly produced imperfection of the original ovarian structures which has been produced, rather than a development of something new. The "bursa copulatrix and the receptaculum seminis have degenerated in the bee and ant workers, and we have every reason for believing that typical parts could never disappear owing to poor nourishment, however poor it may have been." We do not know on what facts the Professor relies for this last statement, but as a matter of opinion we are inclined to agree with him that such parts would not disappear *at once*, but whether they would "never" disappear is another matter. But what interests us here is this, that in the bee and ant workers many, in fact most, of the ovarian tubes have become atrophied, and it is only to be expected that there should be a comparative failure in the structurally less important parts of the "bursa copulatrix" and the "receptaculum seminis," because the occasional laying of eggs by workers proves, as we have before shown, that the essential egg-producing structures are still present. These ovarian ducts, the Professor thinks, should no more disappear as a result of the poorest feeding than "would a leg or wing." The Professor asks, "How often have caterpillars been reared *en masse* on starvation diet, either designedly or from carelessness, and yet none of them has ever given rise to a butterfly destitute of wings, or to one with only four legs instead of six. Such butterflies are always very small, but in other respects perfect, just as in the case of the ill-fed flies." Well and good, the Professor owns that they are smaller all round—wings, legs, body, etc. The ill effect of the feeding is not thrown upon one organ more than upon another, but the whole structure is less, and the four wings probably often contain only the same amount of material as would be found in two if the larvæ had been well fed. Again, if this poor feeding were carried through several successive generations, does the learned Professor think that no permanent results would accrue? But this is not all. It happens that butterflies do, as the Professor points out, become imperfectly developed all round, they preserve a sort of symmetrical condition, but moths often do nothing of the kind. Ill feeding causes the latter to become crippled in all directions, and moths with two or three atrophied wings, or with atrophied legs and atrophied antennæ are the result; the disappearance of an organ may thus be an ontogenetic process, and although the Professor states that it

"never in any case depends on mere influences of nutrition, such as affect the development of each individual," I think it only wants sufficiently wide experiment for him to modify his opinion, and then what becomes of the assumption based on these premises? And it is on these assumptions that the Professor builds up his theory that in the germ-plasm of an egg of every social insect there are three distinct reproductive systems, two of which fail and one of which develops, and determines the character of the insect which shall ultimately be produced under certain stimuli—the "three sorts of primary constituents in the germ" being the male, and two forms of the female.

Having thus come to the conclusion that want of nutrition cannot produce the disappearance of a typical organ, the Professor suggests that the facts he has brought forward "support neither the idea that the degeneration of the ovary of the workers is a direct consequence of poverty of nutrition, nor the view that an increased sensitiveness of the ovary to the influence of nourishment is here concerned. But they do show that *poor nourishment acts as the stimulus for the latent primary constituents for the workers in the germ-plasm;—not only for those of the ovary, but also for those of all characters by which the worker is distinguished from the queen.*"

Now if this means anything, it means this—that the poor feeding of a certain brood of larvæ of flies or butterflies gives rise to small specimens with ill-developed external structural parts, but so far as the Professor can guess (for he does not tell us that he tested the matter) there were no structures (internal or external) absent, they were only smaller, and the reason for supposing that the internal structures were wholly present was not based on an examination of the structures, but was a mere matter of supposition based on examining the external organs; and that not having pursued the experiment which resulted in producing a first brood of small and ill-developed flies to a second generation, but only to the extent of seeing that the first brood paired and laid fertile eggs, the Professor is able to assert that there was no increased sensitiveness of the ovary to the influence of nourishment, and therefore on these powerful premises the above italicised law is laid down.

The Professor has here reached the point in his argument where he has satisfied himself that poor food has not been the stimulus which directly, even in the course of unknown generations, produced the imperfect development of the ovaries of the workers, and hence we may assume conversely, produced the highly developed condition of the ovaries of the queen, that the high feeding to which we know the queen is subjected, in fact, has nothing to do with the enhanced development of the latter; that there are in every egg two indefinite somethings called "ids"—a male-id, and a female-id—and that fertilisation, or its absence, determines which of these "ids" shall develop, and that in the former case (fertilisation) the female-id is developed, in the latter case (absence of fertilisation) the male-id is developed. Fertilisation, then, having determined which "id" shall be developed, if it be a female-id that is developing, then the female-id is in its turn composed of two parts—a worker-id part and a queen-id part—and the kind of food supplies the stimulus which determines whether the female-id shall produce a worker or a queen. "Slow processes of selection have gradually changed the 'female-ids'

in two directions, and finally led to the establishment of two perfectly distinct forms of female," the Professor says, and yet after determining in his own mind that selection (we are not told what selection, or how it acts) has "led to the establishment of two perfectly distinct forms of female," the Professor goes on to state:—"That the process has not been sudden, but has been brought about step by step, is apparent; for even at the present day a number of stages in these metamorphoses are still to be found among the workers of the different species of ants. Moreover, sporadic transition-forms between workers and females also occur, and show varied combinations of characteristics." Yet, in spite of this, the Professor tells us there are "two perfectly distinct forms of females." Does he mean to suggest that morphologically the ovaries of the queens and workers are not one and the same organ in different degrees of development, between which he states there are transition forms? If so, I doubt whether anyone will agree with him. If he does think they are the same, and I think he does, for he says that "the degeneration of the ovary has proceeded on its slow phyletic course, step by step, and has caused one egg-tube after another to disappear," how does his theory of two kinds of female-ids explain the origin of the differences which exist in queens and workers? Is not the theory merely a suggestion of how the differences may be supposed to be transmitted, rather than an explanation of origin? That the Professor considers the ovaries structurally the same in workers and queens is again evident when he tries to convince his readers that the germ-plasm is really composed of "ids," for he refers to "the gradual metamorphosis of the females into workers among state-forming insects." What, then, does the expression there are "two perfectly distinct forms of females" mean? I fail entirely to see in what way there can be considered two forms at all. The rest of the learned Professor's arguments are based on the theory that the germ-plasm is actually composed of "ids," and that the "ids" can be again subdivided into the "primary constituents of the different independently varying parts of the body—that is of 'determinants,'" and as he has entirely failed to convince us in his explanation of the presence of these "ids" in the germ-plasm, or in fact of the necessity of the supposition that they are there, it is clear in our opinion that the rest of the conclusions are of no great value.

It may be well, however, briefly to consider the remaining points of the Professor's arguments with regard to social insects. He assumes that at first only a small group of the "determinants" of the egg varied in the case of ants, possibly those "of the reproductive organs and wings," and on the variation of these determinants in the egg, the female-id became modified into either a worker-id or a queen-id, whilst he still further supposes that in those ants where two forms of workers occur, the worker-id sometimes became modified in the direction of forming soldier-ids.

By supposing the germ to be made up of a number of "ids," which in their turn are subdivided into "determinants," or primary constituents of the different parts of the body, the Professor explains the phenomena of "polymorphism" by the suggestion that it is in all cases a variation of the determinants of those parts which have to adapt themselves to new demands of the conditions of life, and hence that the development of any of these variable determinants would produce an altered form.



At the same time the phenomenon of reversion is explained by supposing that, whilst many, or most of the ids, undergo change, yet some of the "ids" will remain unchanged, and the occasional development of an unchanged "id" produces a reversion.

The Professor then asks "if in the germ-plasm of the bee there is only one primary constituent capable of developing into a queen under the influence of rich food, and into a worker when poorly nourished, how could we explain the fact that in the latter case not only does degeneration of individual parts occur, but also a different and stronger development of other parts?" He points out that the stimulus of poverty of food brings about degeneration of the ovaries, the receptaculum, and the wings, and frequently a reduction of the entire bulk of the body on the one hand; and on the other, increase and higher differentiation of individual parts, such as the brain in worker ants, and the head and the jaws in soldiers. We have yet to learn the excess of brain development in the worker over the queen ant, and its dependence on quantity of food, whilst the researches of Grassi show that the extra development of soldiers above workers is also brought about by food. The difficulties of Weismann's explanations lie in the fact, that all these modifications of the insect are possible after the larva has existed some time as a larva—i.e., as an independent organism, capable of being acted upon by its own environment—and since the quantity of food given determines the amount of structure built, and a small quantity of food ends in the production of certain ill-developed structures, whilst a larger quantity of food produces the same structures in a more perfect and well-developed form, it appears to be rather far fetched to say that these variations—even the frequently striking small size of the workers—do not originate owing to the "direct action of poor food." It is ridiculous to say that the poverty of food is only the stimulus by means of which these ill-developed structures are produced, whilst the richness of food is only the stimulus by means of which the well-developed structures are produced, when a supply of rich food will produce them if the larva gets it when quite young; it seems to me only a matter of common logic that if the larger quantity of rich food is wanted for full development, that the smaller quantity of poor food cannot produce full development, and cannot supply even the crude material to build up the more complex structures. The latter cannot be built up it is clear, because the worker-larva does not get the necessary food to do it; give the worker more food, raise its temperature—in other words, produce in the insect more energy—and the worker becomes a queen, or reaches some intermediate stage on the way to doing so, in proportion to the increase of energy developed. "Should we attempt to make dwarfs of any insect by starvation during the course of development, we should at most get a reduction to about half the normal size," the Professor says, and I would add to this, "in one generation." This result the Professor obtained in a few days with *Musca*, and we can get a similar result with many moths in a few weeks. What would be the result of continuing this for ages? Many insects we should exterminate, others would adapt themselves to the altered conditions. Many dwarf races of common insects do maintain a precarious existence on the bleak hill-sides, &c., where the food is sparse, whilst their larger relatives in other localities revel in plenty. Natural selection has adapted them in large part to their surroundings,

but as a rule they are scarce in such places, they lay fewer eggs, probably, but certainly "dwarf races" of insects can be "produced by partial starvation during the course of development." The Professor leaves out of account how long natural selection has been teaching the ants and bees the minimum of food which will not endanger their working power, and yet not develop their reproductive organs beyond a certain point. One brood of flies and butterflies is of but little service for generalisation, or for comparison with times or ages like these, in fact it is the poverty of the Professor's facts which must astonish the practical naturalist, who deals with things rather than theories. Truly we agree with the Professor that "we cannot seriously suppose that these larvæ are really insufficiently nourished and kept small by hunger," and we also agree that they get "exactly as much nourishment as they need for the development of the worker-type and as their instinct demands for the time when they have become worker-larvæ, owing to the poorer food." But this we venture to think is not due to the presence of any special "id," so much as to a response in the larval organism itself to this particular condition of environment, which response natural selection has, in the course of ages, bred into it, and yet, in the face of the fact that, as the Professor tells us, "the worker-larva is a distinct individual, with its own particular tendencies and instincts, just as much as is the full-grown worker," and that "bee larvæ all receive similar food for three days only, and thus long they are undifferentiated," we are to suppose that it is some peculiarity of the germ-plasm which settles the final development, and not the reaction of the larva to a stimulus directly applied in the way of food, the reactions due to which are palpably plain to our intelligence as a matter of actual quantity.

We quite agree with Weismann as to the remarkable fact that "this adaptation of the larval organism to the determining stimulus of a specific mode of nourishment should be so perfectly similar in two such different groups of insects as the bees and termites, for there can of course be no doubt that it has arisen independently in each group." The same result has been arrived at owing to the same necessity, it is that part of the physical organisation which the community can reach which is affected. They can govern the food supply, and a limited food supply having produced advantageous results to the community, the particular line of producing the necessary modifications is persevered in. To us there is no necessity for considering the germ-plasm of the worker egg to contain but one "id," which is capable of development to any point extending between the most highly-organised queen or the most lowly-organised worker; that this power exists even in the newly-hatched larva, and that then the stimulus of food comes into play, both as determining the quantity and direction of the development, natural selection having determined the normal limits which shall produce the best organised queen-product, and the best organised worker-product—best in the sense of their future requirements and work—but that they are two distinct forms of females, with a separate ontogeny, the Professor's arguments have entirely failed to convince us.

## VARIATION.

**BREEDING THE DARK VARIETY OF *SPILOSOMA MENTHASTRI*.**—I have been very much disappointed in the specimens of *S. menthastri* that I have bred. I have obtained a considerable number, but they have not at all followed the dark coloration of their parents, and much more nearly approach the ordinary South of England forms. This has surprised me, because the dark moths that I bred were not isolated extremes of the buff-coloured form. The whole race, so far as I can make out, is of that shade of colour in those parts of Argyllshire in which I have collected. Possibly the food they eat in the North, or the climate there, is the cause of the darker colour.—W. M. CHRISTY, F.E.S., Watergate, Emsworth. *June 14th, 1895.*

I had some pupæ of *S. menthastri* from the same locality as those of Mr. Christy. One male emerged very dark brown; the others varied from quite white to buff-coloured.—T. MADDISON, South Bailey, Durham. *June 28th, 1895.*

**LARVÆ OF *ACHERONTIA ATROPOS* (TYPE AND VARIETY) AT CHICHESTER.**—The larvæ of this species have appeared in some numbers in this neighbourhood during the month of August. I had eleven of them in my possession. Although I have, from time to time, reared a good many of the larvæ—one year I had forty—I have never before had a variety, though I have occasionally seen such. Singularly enough, several of my larvæ this year were of the dusky variety, which, instead of being of a beautiful apple-green tint with violet and yellow streaks, is dingy brown with a latticed pattern of dull blackish purple on the sides and back, and a sprinkling of dirty white spots, the anterior segments being white, with two stripes broken up into spots a little darker than the general colour of the body. Both type and variety have a similar whitish warty caudal appendage. Some of the larvæ were found feeding on potatoes, some on jasmine. All have now gone to earth. None of these larvæ emitted any sound. On other occasions I have repeatedly heard a sound emitted by larvæ, which resembled the "click" of the electric spark, and was quite distinct from the "squeak" of the moth.—JOSEPH ANDERSON, JUNR., Alve Villa, Chichester.

---

## CURRENT NOTES.

On July 3rd, the bust of Senator Dr. H. Roemer was unveiled in front of the Museum building in Hildesheim, with appropriate ceremonies. The Museum bears the name of its founder and chief benefactor; the collections in different departments of Natural History, as well as in the Fine Arts, are more important than might be expected in a city of the moderate population which Hildesheim contains.

The Rev. W. C. Hey, M.A., reports (*Naturalist*, Aug.) the capture at Askham Bog, in the spring, of two specimens of a rare weevil (*Elmidomorphus aubei*). The species was at first supposed to be new to Britain, but it was afterwards found to have been described by Canon Fowler, in *The Naturalist*, under the name of *Bagous petro*, from a single example taken at Askham many years ago.

Herr. Jachontoff thus describes (*Societas Entomologica*, Aug. 1) a new aberration (♀) of *Epinephele ianira*, from Vladimir, under the

name ab. *illustris* :—"Above, light brownish-grey with metallic sheen. The yellow-ochre spot on the fore-wings paler than in the type. Hind-wings with an indistinct yellow central spot as in var. *hispulla*, or without such a spot."

Mr. C. G. Barrett records (*Ent. Mo. Mag.*) the capture of an imago of *Tortrix piceana*, in Surrey, with a larval head. Mr. McLachlan points out that there was a list of the recorded cases of this form of monstrosity published by Dr. Hagen in *Stettiner Entom. Zeitung*, 1872, pp. 388-402, in which 16 instances were noted, and that others were noted by Prof. Westwood in the *Trans. Ent. Soc., Lond.*, 1879, pp. 221-228. There are also records in our own *Mag.*, Vol. i., p. 175.

Mr. W. H. Bennett adds (*Ent. Mo. Mag.*) *Ochthebius lejolisi* to the British list. It was captured in June, in small pools of very stale and putrid salt water at Ilfracombe, and may be distinguished from other species of the genus by "having the whole of the lateral margin of the elytra toothed saw-like."

Mr. Champion records (*Ent. Mo. Mag.*) that Bedel has discovered (1) that the types of *Ceuthorrhynchidius crotchii* were from Madeira, and not England; (2) that the specimens of *C. crotchii* are identical with *C. nigroterminatus*; (3) that *C. nigroterminatus* is probably distinct from *C. mixtus*, of which it is given as a synonym by Fowler and Sharp.

A record of *Gelechia (Lita) knaggsiella*, taken from tree-trunks, at Reading, by Mr. A. H. Hamm, is most interesting, as it is some years since its capture in Britain has been recorded.

Mr. C. G. Barrett writes (*Ent. Mo. Mag.*) of *Tephrosia biundularia* as a variety of *T. crepuscularia*, a strange conclusion for an observant entomologist who has collected in the South of England. One is not surprised at northern entomologists expressing this opinion, but it is rather inexplicable for southern collectors to do so. After all, though, it only turns on an unanswerable question—What is a species? But so long as we separate *Lycaena bellargus* and *L. corydon* we should separate *T. crepuscularia* and *T. biundularia*.

There are two articles in the August number of *Science Progress* which should be read by all naturalists, viz.: "Insular Floras," by W. Botting Hemsley, F.R.S., and "The Reserve Materials of Plants," by J. Reynolds Green, M.A., F.R.S. The other articles, entitled, "Chemical Affinity," "Views on Mineral Species," and "The space relations of Atoms," will be found interesting, both to general scientists and to specialists.

Mr. Frohawk gives (*Entom.*, Sept.) a very interesting account of the "Life-history of *Nyssia lapponaria*," and accompanies it by figures of the several stages which are models of what illustrations of Natural History should be. Mr. Frohawk obtained some eggs from Mr. W. M. Christy (*vide*, *Ent. Rec.*, vol. vi., p. 284). He describes the egg as of a compressed oval form, and of a very clear bright greenish-yellow colour; a few days before hatching the colour deepens, and just before that event becomes a very deep metallic blue-green. The larvæ fed upon both birch and whitethorn, if anything giving the preference to the latter; they did not eat the cast skin. Four moults took place, and the larva buried itself for pupation at the end of 42 days. It did not spin a cocoon, but the pupa was found simply buried an inch or two under the surface of the earth. With regard to the imago, Mr.

Christy informs Mr. Frohawk that "the insects are decidedly sluggish and disinclined to fly, even at night. My idea is that their time of flight is in the day, and when the sun shines."

## SCIENTIFIC NOTES AND OBSERVATIONS.

**LARVA OF SATURNIA.**—I have recently studied the larva of *Saturnia pyri*, with the result that it approaches in type the North American *Samia cecropia*. Through these observations, the North American genus is seen to diverge from the *Attacid* type, represented in North America by *Callosamia promethea* and *Philosamia cynthia*. A true *Saturnia* is found in California, *S. mendocino*, Behrens; it is an instance of the isolation on the West Coast, through the barrier of the Rocky Mountains, of Palearctic types not spreading over the Atlantic States or Canada. The larva of *Saturnia pyri* has also been examined by Mr. Dyar, who finds it peculiar in lacking the unpaired dorsal tubercle on the 8th abdominal segment. From a study of the larvæ of *pyri* and *carpini* it is difficult to say whether tubercle 1 is consolidated into an unpaired tubercle with its fellow, and the structure lost, or whether 1 is separate and 2 is gone. By analogy it may be concluded that 1 is unconsolidated. The young larvæ of *pyri* and *carpini* are alike in structure, and have the same arrangement of tubercles; each tubercle has the central seta and circular row of spines (eight in number, according to my observations), and the skin bears soft, fine, secondary hairs. According to Dyar, *carpini* is the more generalized, *pyri* the more specialized form; the secondary hairs are greatly reduced, but the central setæ on the tubercles elongated, having acquired flattened and enlarged tips. The tubercles themselves stand up prominently, and are coloured blue, strongly suggesting a simple form of the type of the N. American *Samia cecropia*.—A. RADCLIFFE GROTE. *July*, 1895.

**PAIRING OF HEPIALUS HUMULI.**—On the evening of June 15th, whilst observing a male of this species taking his pendulous flight, I saw a female come up, knock against him, and then drop into the grass below. He also dropped, and in less than a minute the pair were *in cop.* and remained quite motionless. Last night I observed two couples paired; in one case the male was suspended in the air, whilst the female was clinging to a grass culm.—J. FINLAY, Morpeth. *July 8th*, 1895.

**EGGS OF BOMBYX RUBI ICHNEUMONED.**—About the middle of June, I had fifty eggs of *B. rubi* sent to me from Bournemouth. Thirty of them yielded larvæ; the remainder I thought were not fertile, but to-day, looking in the box in which they are, I discovered a great many small flies. Is this a common occurrence?—J. P. THOMPSON, 2, Gladstone Terrace, Grantham. *July 19th*, 1895. [*Vide, Ent. Record*, vol. v., p. 253; vol. vi., p. 33.—ED.]

## NOTES ON COLLECTING, Etc.

**SPHINX CONVULVULI IN SOMERSET.**—A specimen of *S. convolvuli* was given me yesterday by a lady, who found it in a greenhouse. In 1891 three specimens were found under similar conditions by my brother.—A. R. HAYWARD, Ilminster, Somerset. *Aug. 25th*, 1895.

CATOCALA FRAXINI AT FARNBORO', KENT.—Last night I captured a specimen of this moth at sugar, at 8.30 p.m. Unfortunately, I had only a medium-sized bottle with me, so I was very doubtful whether I should secure the prize. However, as good luck would have it, I dimmed my light, and placed the mouth of the bottle within half an inch of the moth, when it gave a flutter and was captured. Lord Derby's keeper was with me at the time, and he was almost as excited as myself. Another friend, who was sugaring in the same wood, and who saw the specimen shortly after I took it, was so overcome by the sight, that he would not take any more small insects off the sugar that night. A specimen was said to have been taken in Bromley, some three years ago, but I never got to the bottom of the matter. In 1890, I bred 19 specimens from foreign eggs; one of these managed to escape while I was trying to bottle it, but there is not much likelihood of this year's capture being a descendant of that brood, as I killed the rest off each day as they emerged, and it is a very remote chance that a pair of them should have copulated without my seeing them. On comparison with the six specimens in my collection from the 1890 brood, this year's capture appears to have the ground colour of the fore-wings much paler, and of a slightly brighter yellow.—HOPE ALDERSON, Farnboro', Kent. Aug. 24th, 1895.

EUPITHECIA SUCCENTURIATA AND E. SUBFULVATA.—About the middle of October, 1894, I found eight "pug" larvæ feeding at night on Tansy (*Tanacetum vulgare*). They were large, and of a dingy brown colour, with darker coloured lozenges on the back. I began to force the pupæ in May, and from them have emerged, so far, one *E. succenturiata* and one *E. subfulvata*. After this experience, I do not wonder that the older lepidopterists (Stainton among the number) considered them to be forms of one insect. I certainly saw no difference in the larvæ, and thought they were all those of *E. subfulvata*, which I had not, up to that time, seen in the larval state. *E. succenturiata* has not, I believe, been found in Staffs. before. I am looking anxiously forward to see what the rest of the pupæ will produce.—R. FREER, M.B., Rugeley. June 12th, 1895.

#### Notes of the Season.

CLEVEDON.—Larvæ, especially hibernating Noctuid larvæ, were not so plentiful as usual this spring, although *Xanthia citrigo* was tolerably abundant on the lime trees.—J. MASON. June 10th, 1895.

RUGELEY.—I found insects decidedly scarce this spring. I obtained, however, two very fine varieties: (1) A melanic var. of *Melanippe sociata*, (2) A similar var. of *Hadena oleracea*.—R. FREER, M.B. June 12th.

YORKSHIRE (BEEDALE AND SLEDMERE).—I recently had a day's collecting at each of these places. At BEEDALE, *Eupisteria obliterata*, *Asthenes luteata*, *Cabera pusaria*, and a few other Geometers were fairly abundant; whilst in the open clearings in the woods, *Argynnis euphrosyne* (nearly over) and *A. selene* (in fine condition) were flying freely; and on a rough hillside, *Nemeophila plantaginis* dashed about with great vigour and freedom. I searched for some time for females, for eggs, but only got one specimen. I captured, however, a nice var. of the male, in which the yellow on the fore-wings is replaced by pure white, the insect looking, as to the fore-wings, like var. *hospita*, the hind-wings being normal. At SLEDMERE, *Abraxas sylvata* (of which I got some nice forms—both dark and light) was very abundant. *Melanippe montanata*, literally, and without exaggeration, was in

thousands. *Asthenia blomeri*, *A. luteata*, *Melanthia albicillata*, *Eupithecia lariciata*, *Macaria liturata*, *Venusia cambrica*, *Larentia viridaria*, *Cidaria suffumata* and var. *piceata*, *Ephyra linearia*, and others, were in more or less abundance. In the open spaces near to the wood a few *Procris geryon*, *Euclidia glyphica*, and an occasional *A. selene* were flying, whilst *N. plantaginis* was also in evidence. Nothing came to sugar except one *Xylophasia sublustris*, the nights, after the hot days, being cold and rather inclined to frost.—T. MADDISON. June 28th, 1895.

DONCASTER.—The season here has been a particularly good one for sugar. I began the campaign on May 25th, and since that date I have sugared on every available night, and have not met with one blank. How different from last year! During May I took 20 species of Noctuids at sugar. In June, 49 species, and so far, during the present month, I have seen 53 species. Besides these, Geometers and other groups of Lepidoptera have been more common at the sweets than usual. Larvæ were very abundant during the spring, but Micros do not seem to be generally common. Mr. Bankes pronounced my *Lithocolletis* (*ante.*, vol. vi., p. 45, and pp. 234-6) to be *klemannella*.—H. H. CORBETT, M.R.C.S. July 22nd.

NEW FOREST and FEN DISTRICT.—I have not found this a good season so far. *Macroglossa bombylifformis* has occurred freely in the New Forest, but other insects are very scarce, and even common larvæ, such as those of *Limenitis sibylla* and *Argynnis paphia*. That is, however, not the case with common tree-feeding GEOMETRIDES, which are again defoliating the trees. I have been much interested in breeding *Pachnobia leucographa*, and observed that, in its earlier stages at least, the larva has a habit when at rest of curling up its body, much after the fashion of *Ephyra orbicularia*, a habit which I have not known to occur in the larvæ of the Taenioctams. Three days spent at Wicken did not yield much result. Sugar, alike in the fen and in the lanes, even on good nights, has been practically a failure; but on one good night *Spilosoma urticae*, *Macrogaster arundinis*, and other fen species occurred fairly freely at light. At Tuddenham, *Agrophila trabecalis* and *Heliothis dipsacea* were plentiful, but *Lithostege griseata* and *Acidalia rubiginata* were apparently over. They must have been out early this year. In the box of a local collector I saw a specimen of what I take to be *Leucania obsoleta*, which he had taken at sugar recently.—J. C. MOBERLY, M.A., Southampton.

SOUTHEND.—*Clisiocampa castrensis* larvæ, which ought to be plentiful at Gt. Wakering, are scarce. My first *Phorodesma smaragdaria* emerged yesterday—an early date. I have one larva of *Epichnopteryx reticella* still feeding, and many larvæ of *P. smaragdaria* similarly engaged, whilst a few adult larvæ of *Polia nigrocincta* are doing well on *Plantago maritima*. Until a few days back, I had never come across the female of *Platytes cerussellus*. I had spent the morning of the 10th on the marshes, had taken three *Myelophila cribrella* and one *Crambus perlellus*, whilst nothing else but male *P. cerussellus* were on the wing. I searched low down for females without finding an example, and was about to start for home, when (about 1 p.m., sunny, and a few drops of rain falling) they rose in force, and appeared to outnumber the males. I set 53 the following morning, and might have taken a much larger number had my stock of boxes not run out.—F. G. WHITTLE. June 20th, 1895.

## NOTES ON LARVÆ, &c.

ON THE MANAGEMENT OF LARVÆ DURING HYBERNATION.—I have about forty larvæ of *Arctia villica*, which hatched in June. I should be very much obliged if some of the readers of this magazine would tell me what plan they have found most successful for the management of larvæ during hybernation. Can I keep them in the house, or would it be too warm and dry?—(Mrs.) D. TWOPENNY, Woodstock, Sittingbourne, Kent.

ON REARING YOUNG LARVÆ.—The method I have adopted, and invariably found successful with newly-hatched larvæ, is to take a small bottle (such as may be had from the stationers with samples of ink) about an inch square and an inch and a-half high; into this I put, with water, the food-plant (a small specimen with the root attached preferred), closely packing about the stems with cotton-wool. This is placed on a piece of white writing paper—cardboard curls too much—and memoranda of date of laying, hatching, name of larva, food-plant and any other useful particulars may be written upon it. On the food-plant or touching it, I place the chip on which the young larvæ are lying, or if in a box, the whole box, in such a way that they can easily crawl upon it. The whole is then covered with a smooth-sided, large-sized tumbler. In two or three days' time, not earlier, if kept from the sun or in a cool place, another small bottle is inserted with a fresh plant, so arranging it that it shall come well into contact with the old one. In a few hours, the latter may be removed. Scarcely any trouble is incurred by adopting this plan. The food keeps fresh until the last, and is so appreciated by the larvæ, that it is quite exceptional to find one of them either dropped upon the paper or crawling about the glass. They remain upon the plant feeding vigorously until the whole is consumed. If *too much* moisture condenses upon the glass, it is tilted for a few moments. I never interfere with the larvæ, nor handle them in any way, if it can be avoided; the doing so is one of the principal causes of failure. Some persons are so anxious about perfect cleanliness and neatness of appearance, that the larva, whether attached to a leaf for the purpose of changing, or not, is ruthlessly removed, and in most cases injured thereby. Put fresh food alongside of the stale, and no fear need be entertained that the larva will make the exchange if it wishes to do so. To my knowledge, I have not lost a single one of the thousands I have hatched this season, while my friends who have tried other methods with the same larvæ, supplied to them by me, have disastrously failed. The larvæ are kept under the tumbler until too large to escape from the ordinary cage, which I make in this way: I get boxes of thin wood from the grocer or bookseller (those about six or eight inches square and about four inches deep, I find most suitable), see that they are free from cracks, and then plane the edges, or rub them down on a sheet of sandpaper, so as to make them perfectly flat. I then get a piece of glass, cut the exact width of the outside of the box, and a little shorter than the height (I stand them on end, with the opening outwards). I then put two ordinary cut tacks into the bottom edge, just so far as to keep the glass quite close to the wood, and into the upper, two wire screw-eyes, such as are used for small picture frames, screwing them in until they hold the glass perfectly firm. A half-turn will allow the glass to be removed. For the earlier stages these cages are not ventilated, so as to retain the



freshness of the plant. Afterwards, I employ similar, but larger cages, *well ventilated*, kept cool and even moist, and in the open air as much as possible for the hardier sorts. I find an occasional *douche* from a watering-pot over the whole cage an excellent thing, and always put the food plant into, say a stone ink-bottle, with water. By getting the cages pretty uniform in size, and keeping the glass clean, scores of these cages may be arranged in tiers, and can be examined with the greatest ease. I always give mine plenty of light, but keep them out of the sun, which quickly withers the food. It is very important to pack the stems, not only to keep the water from evaporating too quickly, but also to prevent the larvæ from drowning themselves. I lost a fine brood of *Melanthia albicillata*, when full fed, in that way. They descended the stem, presumably to pupate at its roots, and as they did so almost simultaneously, the failure to observe them for about two hours was fatal. I have reared the following species this season, in the way mentioned, from the egg:—*Endromis versicolor*, *Orgyia antiqua*, *Eupithecia pulchellata*, *Melanthia albicillata*, *Calocampa vetusta*, *Cerigo matura*, *Naenia typica*, *Neuria reticulata*, *Dasychira pudibunda*, etc.—C. W. WILLIAMS, Penarth. Aug. 12th, 1895.

PUPATION OF CALLIMORPHA HERA.—The larva of this species, unlike most of its congeners, goes beneath the surface to undergo its pupation. Perhaps this is the reason why some have failed to rear it.—C. FENN, Lee, S.E. June 22nd, 1895.

FEEDING HABIT OF SESIA MYOPIFORMIS.—The larva of this species feeds just under the bark in trees that are suffering from canker, or that have been injured by the rough removal of branches.—IBID.

KNOT-GRASS TO THE FORE.—(1) The larva of *Hadena contigua* is said by the authorities to feed upon birch and oak. Mr. Tutt sent me a batch of eggs this year, with the suggestion to try the larvæ with knot-grass. Accordingly, when they hatched, I gave them the choice between birch and knot-grass. They very speedily and very emphatically manifested their preference for the latter, and fed up well on it. (2) Bilberry and heather are given as the food-plants of *Emydia cribrum*. A batch of larvæ have, however, thriven on knot-grass and one of the common grasses, and are now fast pupating. The larvæ are of foreign origin; possibly in their native haunt they feed on different plants from their British relations.—F. J. BUCKELL, M.B., 32, Canonbury Square, N. Sept. 6th, 1895.

## SOCIETIES.

At the meeting of THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY, on June 13th, 1895, Mr. Carrington exhibited the flower of a petunia having the petals edged with green, which he said was a common "sport" in Germany. Mr. Frohawk: a dark leaden-blue *Lycaena bellargus*, taken at Weymouth in 1892.—On June 27th, Mr. Jäger showed a series of *Spilosoma lubricipeda*, bred from parents of the var. *radiata*; among them were representatives of both var. *radiata* and var. *fasciata*, as well as specimens almost of the normal type. Mr. West (Greenwich): specimens of *Cryptocephalus nitidulus*, *C. coryli*, *C. aureolus*, and *Elatér elongatulus*—all taken in Headley Lane on June 8rd.—On July 11th, Mr. Fremlin exhibited a long and variable series (bred) of *Phorodesma smaragdaria*, which had been set with the aid of a blow-pipe. Mr. Oldham: *Sirex gigas* from

Wisbech. Mr. Adkin: a yellow var. of *Ematurga atomaria*.—On July 25th, Mr. Hall exhibited a long and variable series of *Dianthoecia carpophaga*, bred from larvæ found on *Lychnis vespertina*; one specimen had all the usual markings nearly obliterated, and at the other extreme was a specimen in which the markings were much extended and intensified. Mr. Robson: an exceedingly pretty suffused form of *Zonosoma pendularia*. Mr. Turner: a series of *Lycaena aegon* from Oxshot, including specimens in which the spots on the undersides were amalgamated, blue-splashed females, and one female which was indistinguishable on the upper side from *L. astrarche*.—On August 8th, Mr. Hall exhibited specimens of *Hadena oleracea*, in which the reniform and orbicular stigmata could scarcely be traced. Mr. Adkin: a series of strongly-marked *Eupithecia tenuiata* from Drogheda. Mr. Step: a specimen of the pugnacious squat lobster (*Galathea squamifera*), from Portscatho. Mr. Turner: a specimen of *Euchelia iacobaeae* with a small additional spot. Mr. South, in exhibiting a number of specimens taken near Macclesfield during the present season, remarked on the absence of melanism in that district, although the conditions were apparently favourable for its occurrence.

On Monday, August 5th, 1895, the NORTH LONDON NATURAL HISTORY SOCIETY made an excursion to Redhill, arriving at Redhill station about 11 o'clock, and proceeding at once to a chalk-pit on the opposite side of the town, towards Reigate. The morning was fairly fine, but there was very little sunshine, and the weather looked somewhat threatening. Insects were not plentiful. *Eubolia bipunctaria* was taken in some abundance, but the "Blues" were almost entirely absent, and very few other species were about. One or two *Acidalia ornata* were taken, and Mr. Harvey captured a solitary specimen of *Colias edusa*. Later on, one or two good specimens of *Lycaena icarus* turned up. The party presently proceeded towards Reigate, but soon after their arrival there a drizzling rain came on, which had evidently set in for the day; this induced them to take an early tea, and return home immediately.—At the meeting on August 8th, Mr. Nicholson exhibited a moth of a leaden colour, and almost destitute of markings, except the subterminal line and discoidal spots, which he believed to be a variety of *Mamestra brassicae*. Mr. Battley mentioned that he and Mr. Rose had taken 50 larvæ of *Spilosoma urticae*, at Broxbourne, on the 3rd inst. Captures of the larvæ of *Choerocampa elpenor*, at Ponder's End, were reported. Mr. Prout wrote from Sandown that *Colias edusa* had become fairly common, and that he had taken two more specimens of var. *helice*, but that sugar on the whole had been a failure. Mr. Smith reported the capture recently, at Barmouth, by himself and Mr. R. W. Robbins, of *Hipparchia semele*, *Argynnis aglaja*, *Leucania littoralis*, *Agrotis vestigialis*, *A. tritici*, *A. corticea*, *Plusia interrogationis*, *Larentia olivata*, *L. caesiata* and *Melanippe galiata*.

THE BIRMINGHAM ENTOMOLOGICAL SOCIETY met on June 17th, 1895, when Mr. A. H. Martineau exhibited *Sinodendron cylindricum* (♂) from Solihull; *Criorhina asilica* from Trench Woods; and some unusually fine *Andrena rosae* var. *trimmerana* from Clifton Downs. Mr. R. C. Bradley: a number of heads of grass from Sutton Park covered with great numbers of *Melanostoma scalare*, which had been killed by a fungus; they were found only in one spot a few yards square; it appeared as if, having been attacked by the fungus, they had assembled

in this spot to die ; in fact, while he watched he observed others come and remain to die ; also an *Ichneumon*, the thorax of which, when captured, was covered with bright red parasites of large size, making the insect appear to have a very large bright red thorax ; also a specimen of *Crabro palmipes*, with a cluster of eggs at the base of the wings on one side. Mr. V. Smith : *Pterostichus lepidus*, (*Cymindis vaporariorum*), and *Thymalus limbatus*, from Cannock Chase.

## REVIEWS AND NOTICES OF BOOKS.

**Harrow Butterflies and Moths (Vol. I.),** by J. L. Bonhote, M.B.O.U., and Hon. N. C. Rothschild, F.E.S., F.Z.S. [Sold for the Harrow School Scientific Society, by J. C. Wilbee, Harrow].

We have read for review a great many local lists of Lepidoptera, some good, many indifferent, but very few have ever exhibited the care, both as to the arrangement of the contents, and the general get-up of the book, that this little volume exhibits. The introductory notes are to the point, and we quite agree that "strict conformity with a standard list is of more importance than strict accuracy." It only occurs to us whether, if this be right in principle, Standinger's *Catalogue* should not have been followed. We do not agree with discarding the term "variety," nor are the reasons given for doing so sound or logical. The term has a definite meaning, and because it has been previously used for "subspecies" and "aberrations," its disuse for "local races" is not to be praised. We have one other point to cavil about, and that is the retention of the *Incompletæ* among the Macro-Lepidoptera so-called. The principles on which the classification of our larger moths should proceed have now been largely agreed upon. The best thinkers in America and Europe are at one as to the main lines of classification, and there is no excuse for the maintenance of the old shibboleths by our younger workers, who have been trained under entirely different conditions from those of our older workers, whose science is of a pre-Darwinian era. We note with pleasure that the *Nymphalidae* and *Pieridae* are brought together among the butterflies.

So much for our growl, and we state plainly that we growl only because we want to see the young workers break completely away from the conservatism that is at present the curse of entomology. The whole list, as far as it goes, is excellent ; it is evidently a labour of love, carefully, and, in its way, successfully carried out.

As to the detailed notes in connection with the various species, they are to the point, carefully thought out, and in the main correct. The most incorrect statement we notice is with regard to *Colias hyale*, in which the authors, on the authority of Mr. Frohawk, state of the species that, "As six weeks is more than sufficient for the entire metamorphosis of this butterfly, there is a succession of broods in favourable years, and so no exact time of appearance can be given." This is approximately true of *C. edusa*, but when *C. hyale* immigrate here in May and June, the brood resulting from the eggs laid by the immigrants appears very regularly in August, nor has another brood following this ever been recorded, as was the case with *C. edusa* in 1877. If we cannot say much for the conclusions which Mr. Frohawk deduces from his observations on butterflies, we have nothing but praise for the excellent plate which he draws as a frontispiece to the little volume.

# The Entomologist's Record

## AND

### JOURNAL OF VARIATION.

---

VOL. VII. No. 8.

NOVEMBER 1ST, 1895.

---

#### Entomological Reminiscences of the Tyrol.

##### I.—A DAY IN THE MENDEL PASS.

By J. W. TUTT, F.E.S.

The air is redolent with the scent of the newly-mown hay, with the fragrance of pine and larch. The harsh cry of the raven is occasionally heard, and the noise of a rushing mountain stream is borne musically on the light breeze that lingers over the hillside on which we stand. Far below us, in the valley, the whetting of the mowers' scythes makes music almost as sweet, whilst, as our eye roams over the scene before us, we note where—

“The sweeping scythe now rips along,  
Each sturdy mower emulous and strong,  
Whose writhing form meridian heat defies,  
Bends o'er his work and every sinew tries;  
Prostrates the waving treasure at his feet”—

and, truly, the meridian heat here is not to be despised.

As we gaze down this branch valley of the great Val di Non, on either side of which steep mountains rise, miles and miles of lovely Tyrolean scenery open out before us. Among the fertile fields lie scattered villages, surrounded with Nature's choicest gifts, forming magnificent pictures, and filling with dreamy old-world impressions the nature-lover's mind. Far from the busy life of towns and cities, the peasantry of these beautiful recesses of nature speak to us of sprites and fays and fairies, of the folk-lore of these retired and lovely nooks. The readers of this magazine are scientific, you say, they don't believe in such nonsense. Don't believe it? Who can roam the hills and vales, the nooks and corners of the woods, the lone moorland, the misty marsh, or the honey-combed sandhills by the sea-shore, and not be interested in the old legends of these lonely citadels, far from the world's hasty rush? Who does not say at such times with the poet—

“Oh! Queen of Fancy! What an empire thine!

What classic loveliness pervades thy shore!

Creations which the bard hath made divine—

Idols and gods—all creeds alike adore.”

But here we are knee-deep among the heather, scabious and hieraciums, which carpet the ground between the larches and pines that are scattered over the hill-slopes. The trees are not closely packed, the sun gets into all the nooks and crannies; the vegetation is of the most

vigorous kind, and butterflies and moths abound. A few yards behind us the road from Mendel sweeps over a bridge and then turns rapidly south to Fondo. The bridge crosses a steep watercourse that contains now only a little restless, bustling stream; to its bed steep grassy banks run down from a point just to the right of where we are standing as we look down the valley.

Let us step back to the road and see what insects are to be found in this charming spot. A stony embankment, covered with thistles, leads from the road to a level grassy piece of ground on the borders of the larches. On the thistles *Argynnis paphia* abounds. They fan their wings in the sun, and the males show us the thickly-set black androconia that are packed along the nervures; they close their wings, and we see the silver bars running through a ground colour formed of the most exquisite purple reflections; the var. *valesina* occurs occasionally, but is not common. Two smaller allies are soon detected, *A. aglaia* and *A. adippe*, the former with abundant silver spotting, the latter with a rich fulvous band crossing the hind wings on the underside. And hereon hangs a tale. Some five years ago I was in Canterbury, and called on the late G. Parry, the collector there—of *niobe* fame. He showed me his insects, and told me he had an *A. niobe* to dispose of. I asked to see it, and was much astonished to find that it was an example of this striking variety of *A. adippe*. I was assured, however, that this band was the characteristic mark of *A. niobe*. I then pointed out that it was only a form of *A. adippe* which I myself had once met with alive in the woods of Chattenden, and at last I took Parry's specimen away with me. Since then, the form has become quite familiar to me on the Continent. Another species of *Argynnis*—*amathusia*—also occurs, but it is worn and evidently over, the rich purple under-side having lost much of its pristine beauty. *Lycaena corydon* is on almost every flower—the only really common Blue in this district. *Melanargia galatea*, rather dark in colour, as it appears to me, abounds, whilst *Epinephele ianira* and *E. lycaon* (its twin-spotted sister) also fight for a place. Burnets boom from flower to flower—*Zygaena achilleae*, *Z. lonicerae*, *Z. medicaginis*, *Z. carniolica*, *Z. scabiosae* and *Z. transalpina* are among those that are observed, the latter being by far the most abundant species, and in the finest condition.

From the slopes opposite, crossing the road with rapid flight, and then settling on a flower below, comes *Colias hyale*, and soon we observe *C. edusa* flying more leisurely along. How these insects always charm me! 'Tis said that "Familiarity breeds contempt"; I have seen hundreds, nay thousands, of specimens of both species in Britain, have become familiar with them, but the contempt is a thing that has yet to show itself. As we pass through the thistles we disturb some specimens of a large species of *Syrichthus* and *Lycaena astrarche*. On the level flat below *Coenonympha satyrion* abounds, the females very large, the ocellated spots exceedingly well pronounced. A sharp, rapid buzz, and *Pamphila comma* stands on the flower at our feet; it depresses its lower wings strangely, whilst the upper are held more erect. We soon discover that this species is very abundant. Their undersides, however, are remarkable, for the spots, ordinarily white in British examples, are here yellow, very like those of *P. sylvanus*, although an occasional specimen exhibits the white colours which our British examples have

made us look upon as typical. A specimen of *Eubolia bipunctaria*, of a rich slaty form, is kicked up as we enter the heather, followed by a rich slate-coloured moth with a deep central band to the forewings. That it is an ally of *E. bipunctaria* we see at once, and a second glance determines it to be *E. moenata*, a reputed British species. What accident, we wonder, brought this to England? With the next step up comes *Acidalia ornata*, and then, flitting under the trees, *Emmelesia adaequata*. As we enter the shady part of the slope, *Melitaea athalia* occurs. I know the *M. athalia* of our woods, and I believe this to be the same species, although I have captured similar specimens which have been called by other names, but which I am quite unable to distinguish from the species I know so well, nor can my friends apparently define the differences they think they see. An *Erebia* is abundant, and we soon determine it to be a large well-ocellated form of *E. euryale*, by some considered to be a variety of *E. ligea*—the notorious Arran Brown. These butterflies flit from flower to flower, and then a strange-looking specimen with a habit rather different from the rest, and a coat of rich brown-black velvet passes by, and as we stop its further progress discover a fine large *Erebia aethiops* in the net. We push our way through the larches, and come to a part of the slope covered with dwarf bushes, thistles, gentians, and all the wonderful array of wild flowers which are found in such openings. *A. selene*, worn, as may be expected, seeing that it is the last week in July, is netted, and then we find that *P. comma* has given place almost entirely to *Thymelicus lineola*. The two species, here, cover exactly the same ground, although each species has its own corners where it is more particularly abundant. Next, through the bushes, *Leucophasia sinapis* is seen threading its way; the male specimens are not at all unlike our English second brood, with the round black spot near the apex. A large white butterfly, with the central area of the fore-wings apparently of a black colour, is puzzling, but it is soon made out to be *Aporia crataegi*, female, the transparent portions of the fore-wings having a black appearance. *Pararge maera*, with similar habits to *P. megaera*, flits about, whilst *Lycaena minima*, *L. semiargus*, and *L. icarus*, are also netted. Then a yellow moth rises, and we examine again with pleasure the rich golden coat of the typical *Lithosia lutarella*. This beautiful insect appears to be distributed throughout the whole of the Alps, in suitable spots, much as is *Setina irrorella*, which latter, however, is here of the most typical form. Basking on the flowers in the hot sun are *Lithosia complana* and *L. lurideola*, identical with our British specimens, and one is constrained to wonder how far back in the mists of antiquity these two apparently closely allied species took on their special forms and became identical with the forms we see now. Larvæ of *Viminia euphorbiae* are found in the net, and appear to be somewhat common, whilst *Pyrausta purpuralis*, very strongly marked with gold, is abundant, although not occurring in such swarms as *Herbula cespitalis*. Another yellow moth gets up; 'tis a large male of *Epione parallelaria*, a species which also appears to be very widely distributed in the Alps. Walking through the heather drives up plenty of *Eubolia moenata*, *E. limitata*, and *Cumtogramma bilineata*. *E. limitata* is by far the most abundant species in the district. We let ourselves carefully down the steep bank to the stream, and some doubtful *Acidalia humiliata* are disturbed, whilst on the beds of

thyme *Aciptilia tetradactyla* abounds, and among the scabious *Mimaeseoptilus bipunctidactylus*, in pallid dress, and of a rather unusual form, is not uncommon. *Sericoris alternana* is also abundant, and then we turn out the lovely *Hypercallia citrinalis* (*christiennella*), in its beautiful dress of saffron and crimson. Quite a Kentish chalk bank you see in its insects, but with the insects of a Scotch mountain-side combined with it. Such a strange but delightful mixture—*A. crataegi* and *E. aethiops*, *S. alternana* and *H. citrinalis*, *A. humiliata* and *E. adaequata*, *C. hyale* and *M. athalia*, *E. parallelaria* and *L. sinapis*, *A. paphia* and *T. lineola*.

But we drop down the bank to the right, and soon get among the rocks that lie in the bed of the stream. *Larentia olivata* and *Eubolia bipunctaria* are disturbed, and as we work our way up to the stone bridge, and pass under its archway, we disturb a number of Gnophids—we recognise *Dasydia obfuscata* and *Gnophos dilucidaria*, but these rock-moths must have a special note to themselves some day, if space will allow. We climb back into the road. *Hipparchia semele* flits among the rocks at the side, and a fine large creature settles in the road, fanning its wings, displaying the deep chocolate tint and pale border of *Vanessa antiopa*. How it struggles in the net for freedom! No quiet yielding up of its life, but a struggle, fierce and determined, reminding one of *Apatura iris*. A thrill runs through one when one puts an end to such a thing of life.

A large rich *Erebia* suns itself on the rocks. It is the magnificent Tyrolean *E. nerine*. A bed of thistles shows *Gonepteryx rhamni*, and quite a brood of *Argynnis latona* sporting with the swarms of butterflies, ordinarily to be found in such spots. But we are now almost at our hotel, and Pilsener looms large, written in our thirsty throats in letters of fire. This rich collecting ground is practically at our doors. In front, behind, around us the pine woods stretch, or wastes of heather and flowers, or thymy slopes extend, all swarming with insect life. The hot sun pours down its powerful rays, our collecting boxes are full, and we seek the grateful shade to overhaul and set our captures of the last few hours—and read the last postcard from home—"No collecting to be done—weather atrocious!"

### The Resting Habit of Insects as Exhibited in the Phenomena of Hybernation and Aestivation.

By WM. FRANCIS DE VISMES KANE, M.A., F.E.S.

The article on the above subject (*ante*, p. 1) contains much suggestive matter, but the speculative theory propounded by Mr. Tutt to account for the various array of interesting facts relative to the hybernation of Lepidoptera appears to me somewhat far-fetched, and to rest on quite insufficient warrant. And, whether it is due to the wide field traversed or to the necessity of curtailed quotations, the argument appears to suffer from a want of homogeneity, which offers considerable difficulty in attempting a fair criticism and analysis of its bearings. For the opening paragraph seems almost to assert the omnipotence of external circumstances to mould the organism, though its co-operation with them as an independent entity is partially acknowledged by the expression, "the internal forces so far as they exist." Again, in the succeeding paragraph the writer does not

discuss the position apparently (in the detached quotation given) assumed by the late Prof. Romanes, in which he ranks plants and animals in the same category as "machines so constructed that stimuli from the outer world cause them to act in the most purposeful manner for their own maintenance." Yet the arguments urged later on in the article as to the resting habits of insects, rest largely upon the acquired habits and inherited instincts which we all agree to play an important part in animal evolution, and which are evidences of the self-assertion of the organism which often, it is true, but not invariably, "act in the most purposeful manner for their maintenance." Again, in the quotation from Prof. Weismann, the habit of hibernation of the marmot is discussed as though the molecular or histological changes effected in the tissues by cold or other influences were alone to be taken into account. Now, although we must acknowledge that all the phenomena of life are ultimately referable to the potentialities of protoplasm, it only obscures the issues if, when discussing the actions of highly organised creatures, we ignore those qualities which, at any rate in degree, distinguish the higher animals from the plants. The agency of sensations in giving rise to simple ideas no doubt is primary, but the complex secondary influences of memory and acquired morphological adaptations upon the action of the organism have also to be reckoned with. And it is evident, from the whole tenor of the succeeding article, that its author fully acknowledges this. Three sets of factors, therefore, appear to me to control the results. Firstly, The hammering of the environment upon the organism. Secondly, The directly resulting reaction. Thirdly, The interference of Inherited Habits, Morphological Adaptations, and Acquired Instincts (which may be termed ancestral memories); all of which no doubt are derived originally in the race from the respective interaction of the first two factors, but which now act automatically and independently of them. It is this third set of factors which renders the results of external influences variable and often inexplicable, being blind traditional survivals of adaptations which may now have become unnecessary or even partially or wholly unsuitable. The peacock in this climate adheres to the periodicity of its moult, shedding its feathers at the advent of winter, and shivering of nights on the housetop in the "wild west wind" till a new coat has grown. To a bird of less hardy constitution, this combination of two surviving habits would soon prove fatal. The lemming's strange migratory instinct also, which leads to its annual decimation, is well known.

In proceeding to discuss the origin of the hibernating habits of the Lepidoptera, Mr. Tutt points out that the direct action of cold or heat does not seem to account sufficiently for the varied catena of ancillary phenomena, and goes on to question "whether cold is the external stimulus which . . . causes the reaction of hibernation." "Have we ever yet proved a causal connexion between cold and hibernation? I do not think so." And after suggesting that the failure of the food supply is a cause which may act in some cases, and probably was the chief agent in inducing the hibernating habit in most, he gives reasons for thinking that this would not completely solve the difficulty, since there are some both imagines and larvæ which hibernate long before their pabulum grows scarce. He then propounds the rather abstruse but ingenious theory that the encysting of protozoa and some microscopical metazoa (which is in some instances a method



of multiplication, and in others a protective adaptation) may have constituted a "resting habit," transmitted with suitable modifications to higher forms of life. In his statement of the case I venture to take exception to the preliminary proposition that just as protoplasm possesses the quality of giving rise to vital manifestations, "so all (or nearly all) living matter possesses the capacity of assuming a resting state." Have we sufficient warrant for such an assertion? No doubt the germs of vegetable organisms, and in many cases the ova or spermatozoa of certain worms, parasitic crustacea, and some insects, do retain their vitality unimpaired for surprising lengths of time under certain conditions, or in suitable receptacles. And it is also true that many insects and animals in either the immature or perfect stages can remain torpid under certain circumstances, and thus survive accidents of environment otherwise fatal; but the statement excepted to is so wide that it appears an argument from the particular to the general. But the contention is unimportant, as even if the habit were very rare and only occasional, nevertheless we may grant that it may have been transmitted to the Lepidoptera in some shape or form. It would have been more pertinent, however, in supporting the contention, if parallel resting habits had been instanced in the Orthoptera and Neuroptera, closely allied forms of which have been found in rocks of a far earlier formation than any containing fossil Lepidoptera; and if the derivation of this protective adaptation had been sought among those aquatic insects from whose stock many zoologists hold the Order Lepidoptera to have taken rise.

I am unwilling, however (to say nothing of incompetency), to follow the ingenious writer on such a speculative excursus. I prefer to try whether less remote causes can be adduced in explanation. To the question whether a causal connexion between cold and hybernation can be proved, I think I may fairly take my stand, firstly upon the acknowledged fact that the habit seems to be confined to those species of Lepidoptera now inhabiting regions subjected to winter conditions; for if it were a very primitive trait, we should expect to find analogous phenomena surviving among tropical insects. Mr. Tutt suggests that there may be such, but brings forward no example. And, further, it is undeniable that cold as well as excessive heat directly induces torpidity among both higher and lower animals. Humboldt, Waterton and other authors, refer to the stillness of tropical forests during the hottest hours of the day—animated nature taking a siesta. And who has not noticed the sudden failure of energy among butterflies and day-flying moths when a cloud obscures the sun? On the Alps, butterflies are so paralysed by the sudden failure of heat vibrations that they settle at once, and often can be taken by the hand. Unless they pitch on snow patches, as is occasionally the case, which proves fatal, they remain in a torpid state for considerable periods, until sunshine again revives them. Here, at any rate, we have an immediate result from the lowering of temperature. Capacity for resisting cold is, as the writer says, exhibited in varying degrees by the Lepidoptera in various stages, and natural selection has fitted some rather than others to survive the winter. The ingenious theory propounded seems therefore put forward through the necessity of explaining only a comparatively small number of peculiar cases. The instances given are undoubtedly most curious and puzzling, but I do not see that they are inexplicable from the standpoint of natural selection. The writer

protests, however, that it is not sufficient to refer these phenomena to the operation of ancestral habit, brought about by this agency, "without attempting to point out the motive force that causes an insect, surrounded by an abundance of food, and by a temperature so far favourable to its continued existence . . . to sleep through the long summer and autumn without stir or motion." In reply, I would venture to express my opinion that this and similar anomalous habits is one of the unreasonable survivals of once suitable adaptations. It may be that at the period when the climate of such part of Europe as was inhabited by *Arctia caia*, *Vanessa urticae*, *V. io*, and *Gonepteryx rhamni*, approximated to that now obtaining in North Scandinavia, with a very short summer and long winter, all these insects acquired a habit of lengthened hibernation. But during the succeeding ages the idiosyncrasy of the former two may have enabled them partially to conform to their more favourable environment, so that they have in part emancipated themselves from the periodicity of the habit, while the latter two have uniformly retained it; so that every individual hibernates so soon as they have sufficiently replenished themselves with food as to attain fully nourished conditions. The case of *Spilosoma menthastri* may be that its larva was capable of attaining its full development from ovum to pupa exactly within the summer limit, and so never acquired the power of hibernating as a larva; while its relative, *Arctia caia*, in its development either did not synchronise so well, or was less conservative in its habits, and bred rapidly and continuously when altered conditions favoured it. But the changes and chances undergone in primeval epochs by European Lepidoptera, a large proportion of which are thought to have immigrated from Siberia,\* have been so mutable and various, that we can only guess at the alchemy by which nature evolved the vital phenomena now exhibited. No more interesting study could be imagined than to trace the behaviour of various species of the same genera under natural conditions in different climates. The result of such researches might give us some sure footing when venturing upon the uncertain morass of speculation. Some such line of enquiry, I presume, was intended by the rather enigmatical remark, "It would be interesting to examine the internal forces which were acted upon, and which responded in so large a manner to the outside stimuli as to ensure success."

Some butterflies and moths, as has been already stated, are peculiarly capable of adaptation, and some therefore have a very extensive geographical range. *Vanessa levana*, which is said at its extreme N. Russian limit (60° to 68°) to have but one annual brood (the type), has as many as three in Southern Europe. *Dianthoecia capsophila* emerges indiscriminately from the end of April till the middle of August, and hibernates both in the pupal and occasionally in the larval stages. The larvæ of butterflies in the arctic regions are believed to hibernates twice before completing the cycle of metamorphoses. Certain of our own Lepidoptera are only double-brooded in the warmer portions of the British Islands. May we not conjecture that in the intermediate zone such a species might occasionally attempt to reproduce itself twice, with possibly either of two results, namely, that by natural selection a race would survive capable of hibernating as a larva, while the southern race would retain the pupal hibernation;

\* An article on the grounds that form the basis of this supposition would be most interesting from our thoughtful contributor.—Ep.

and the emergences of the two not synchronising, a new species might arise, developing a different facies in the imago by isolation and in-and-in breeding? Or failing this, if the species was constitutionally delicate, and not capable of acquiring larval hybernation, abortive attempts at a second brood would result in its extirpation from time to time (till re-introduced) in the intermediate zone, leaving the northern single-brooded and southern double-brooded races partially isolated, thus giving rise to stable varieties which might eventually become well-marked species. In fact, with all the varying multitudinous elements of interference, both external and internal, which have taken part in the evolution of Lepidoptera, I cannot but consider that every imaginable divergence of habits must have arisen, without having recourse to remoter originating causes such as that propounded in the interesting article under discussion.

One set of phenomena presented by different groups of insects has been passed over in silence: I mean the survival by hybernation of the females only. *Dasypolia templi* is an example among the Lepidoptera, and among the Hymenoptera the females, or females and workers (sterile females), of certain groups similarly survive the winter. Now it would seem likely that if the "resting habit" was, as suggested, based on a survival of an extremely archaic tendency in the Order, it would affect both sexes; while if its origin was of a more recent nature in the history of the species, natural selection would sufficiently account for it. And where parallel phenomena obtain partially, only in different and unrelated orders, it would seem probable that similar necessities had given rise to similar adaptations, and that the survival of the females only in a few genera or species has been the outcome of reproductive exigencies in connexion with recent climatal influence.

## SCIENTIFIC NOTES AND OBSERVATIONS.

ON THE BRITISH SPECIES OF *SMERINTHUS*.—I have read with great pleasure the interesting paper of Mr. A. Bacot, and the intelligent note by Mr. Geo. C. Griffiths, on the English *Smerinthi*, contained in the last volume of the *Record*. I can assure the latter that the three British species belong to as many genera. So far as I have yet proceeded in my study of the literature, these genera and their types are as follows: 1—*Smerinthus*, Latr., 1801, with the type *populi*. I formerly thought that the type was *ocellatus*, but Latreille, I believe from my subsequent notes (I have not at this moment the works to consult), designates *populi* alone, thus restricting his term. With this genus, *Amorpha*, Hübn, 1806, proposed for the same type, becomes a synonym. 2—*Mimas*, Hübn, 1818, with the sole species, and therefore type, *tiliae*. 3—*Copismerinthus*, Grt., 1886, to this belongs *ocellatus*; the type is *cerisii*, and *ophthalmicus* from California agrees, as well as *ocellatus* from Europe, in having a blunt spine at the extremity of the fore tibiae. We have thus three eyed forms, two in America, one from Europe, all three with a blunt spine. *Paonias*, Hübn., 1818, is a mixed genus, and I have restricted it (in 1873) to the N. American *P. excaecatus*, a species properly named and well figured on the cover of this year's *Canadian Entomologist*. Since *Paonias* was neglected in Europe my restriction has priority, and must be followed. Our *Synonymic Catalogue* of 1865, and my "Buffalo Check Lists of N. Amer. Sphingidæ," in the *Bulletin*, form the basis of subsequent

nomenclatorial arrangements. In these, I first use again genera like *Hemaris* (*bombylifomis*, *fuciformis*), *Aellopos*, *Phlegethontius*, *Paonias*, names now in general use. In America, we have no *Smerinthus* generically identical with *populi*. Our genera are: *Copismerinthus* (*cerisii*, *ophthalmicus*); *Eusmerinthus* (*geminatus*, *jamaicensis*); *Paonias* (*excaecatus*); *Calasymbolus* (*astylus*, *myops*); *Oressonia* (*juglandis*); *Triptogon* (*modesta*). In arranging the material here in the Roemer Museum, I have been able to go over the structure of the European species carefully, and, if the result of my literary researches cannot be contradicted as to what we must consider the type of the generic names in existence, then my nomenclature must be followed. It is of the highest interest, for the study of geographical distribution, that the types should be fixed and the details of their structure understood. Very interesting is the fact, pointed out by me first, twenty and more years ago, that we have a strictly congeneric species with *ocellatus* in Canada and California, but none with *populi* or *tiliae*. My first Buffalo Check List, in the *Bulletin* 2,224, has priority over Butler's revision of the family; the second, 3,220, was published in 1877. The difficult question relates to the restriction of generic names proposed originally for mixed genera; it may be that the full literature will give us a different result for some of the genera in the family. But for the *Smerinthinae*, the *Phalaenoides* of Borkhausen, I believe the above result to be final, as nearly so, at least, as I am able to make it. The genera established by me are valid in my opinion. I have had no chance to study the Asiatic species.—A. RADCLIFFE GROTE, Roemer Museum, Hildesheim, Germany.

GENERIC NAMES IN APATELA.—The object of this brief note is to give the types of the generic names already proposed for the species of *Apatela* or *Acronycta* of authors. I do not know the types of Dr. Chapman's more recent genera *Viminia* and *Cuspidia*. The first is the type of the genus.

*Apatela* Hübn., 1806; type *A. aceris* (Grt., 1875).

*Triaena* Hübn., 1818; type *A. psi* (Grt. restr.).

*Jocheaera* Hübn., 1818; type *A. alni* (sole species).

*Acronicta* Ochs., 1816; type *A. leporina* (Grt. restr., 1874).

*Arctomyzsis* Hübn., 1818; type *A. euphrasiae* (Grt. restr.).

This latter term is evidently intended in the *Verzeichniss* to replace *Apatela* of the *Tentamen*, a name used in the *Verzeichniss* in a collective sense. From this use of *Apatela* I take the family name, *Apatelidae*. I selected one of the species of *Arctomyzsis*, as the type of this genus, not strictly congeneric with *aceris*; while we have a species in North America, *sperata*, which seems to agree with *euphrasiae*. In the long spatulate hairs and habit of pupation the North American genus *Harrisimemna* resembles *Jocheaera*, so that I have little doubt that this genus also belongs to the *Apatelidae*. The larva of *Jocheaera* is evidently protected by its violent colours; that of *Harrisimemna* by its resemblance to a withered leaf moved in jerks by the wind.

*Pharetra* Hübn., 1818; type *A. auricoma*.

Through some oversight I gave *auricoma* formerly as the type of the subgen. *Apatela*, instead of *Pharetra*. Mr. J. B. Smith says (*Cat.* 109), in alluding to *Anytus*: "Mr. Butler thinks this (*Anytus*) much nearer to *Pharetra*, an Arctiid, than to the *Noctuidae*." It might appear from this that Mr. Smith recognised Mr. Butler's division of

*Apatela* (*Acronycta*) among the *Arctiidae*, &c. *Pharetra* is, however, hardly an Arctian, but its type seems to represent a distinct structural group of *Apatela*. I would suggest that the structure of these six English species be carefully made out and compared. Apparently the five groups all occur in North America, together with three others, *Megacronicta* (= *Apatela*?), *Eutoreuma*, and *Mastiphanes*, not represented in Europe. Two other former groups, *Merolonche* and *Eulonche*, are now regarded as distinct genera. All these names, with their types, are given in my recent List.—A. RADCLIFFE GROTE, A.M.

I disagree *in toto* with some of the assumptions in the above paper. (1) There can be no "genera in *Apatela*," unless *Apatela* be used as the name of some group higher than a genus. So far as the group has ever received a collective name, surely *Acronyctidi* is that name. (2) There can be, according to Dr. Chapman's showing, only three natural subdivisions (genera) of our British species of *Acronyctidi*. These have been grouped under the names *Viminia*, *Cuspidia* and *Bisulcia*. (3) Dr. Chapman states (*Ent. Rec.*, vol. i., p. 4): "The *rumicis* group (*i.e.*, *Viminia*) are very closely related and hardly admit of subdivision, although *albovenosa*, on the ground of the coloration of the imago, may be separated for convenience." Further he writes: "The *Cuspidia* group is not so homogeneous as the first, and may be subdivided, if fancy so dictates, into subgenera, of which each species, except the two first, will represent one. Such subdivision might be desirable if one were dealing with the *Acronyctids* of the whole world." Assuming that Professor Grote is dealing with the *Acronyctidi* of the world, it appears to me that unless he can show some very good structural characters, the following classification must be accepted:—

TRIBE	GENUS	SUBGENUS	SPECIFIC TYPE
Acronyctidi	Viminia	The subgenera <i>Arctomyscis</i> and <i>Pharetra</i> are identical, according to Chapman. Therefore, names useless and have no meaning.	<i>rumicis</i>
		<i>Triaena</i>	<i>psi</i>
	Cuspidia	?	<i>strigosa</i>
		<i>Jocheaera</i>	<i>alni</i>
		?	<i>megacephala</i>
		<i>Acronicta</i>	<i>leporina</i>
		<i>Apatela</i>	<i>aceris</i>
	Bisulcia		<i>ligustri</i>

Only thus far can I accept these old names, until Professor Grote can show me some reason for undoing Dr. Chapman's monumental work in this Tribe. This work (so far as Professor Grote's paper goes) remains unchallenged, and therefore I cannot accept mere names (given by Hübner without knowledge of any real alliance) to supersede the biological conclusions arrived at by Dr. Chapman. I appreciate to the full, and see the necessity of, Professor Grote's synonymic studies, but I draw the line when names replace science. From my point of view entomology is a biological subject, and must be treated as such, and when biology clashes with literature, well—literature must go.

It may be as well, while this subject is before our readers, to call their

attention to a curious circumstance to which we have not previously called attention, *viz.*, that in a paper which was published (perhaps buried would be more correct) in *The Annals and Magazine of Natural History*, 6th Series, No. 65, p. 396, May, 1893, Mr. Butler retracts his remarkable views on *Acronycta*, put forth in 1879. It will be remembered that Mr. A. G. Butler, in 1891, whilst Dr. Chapman's papers on "The Genus *Acronycta* and its Allies" were running through the *Ent. Record*, attempted to quarrel with Dr. Chapman's names—*Viminia*, *Cuspidia* and *Bisulcia*. It will also be remembered probably by some, that I criticised (*Ent. Record*, vol. ii., p. 82) his views, and that Dr. Chapman also criticised (*Ent. Record*, vol. i., pp. 269-270) his remarkable paper on the genus, which was published in the *Trans. Ent. Soc. Lond.*, 1879. The matter then dropped, until by chance I heard of the paper in *The Annals and Magazine of Natural History*, referred to above. Here Mr. Butler writes: "A recent study of the transformations of *Acronycta* in Abbott's unpublished volumes has now clearly shown that the difference in the clothing and outline of the larva characteristic of the *Bombycid* families, already referred to, occurs in various species of the same group in *Acronycta*, and so are valueless as indicative of their affinities. I am therefore obliged to renounce my former opinion, and admit that *Acronycta* is, in truth, a genus of *Nocturæ*, probably nearest allied to *Polia*." This climb down does Mr. Butler great credit, although it had better have been made in a magazine that most entomologists see. I would, however, remark that it is curious that the date is so suspiciously subsequent to Dr. Chapman's papers on the group (which were completed in 1893). But Mr. Butler gives no hint of ever having heard of these papers, and avers his recantation to be due to "a recent study of Abbott's unpublished volumes." He goes on to discuss the subgenera of *Acronycta*, and gives a synopsis, which includes several curious anomalies. These subgenera are:—

1. *Acronycta* including *leporina* and 4 other species.
2. *Megacronycta* " *americana* and 2 others.  
(This is really congeneric with *aceris*).
3. *Arctomyscis* including *aceris*, *euphrasiae*, and 4 other *Viminiae*.
4. *Apatela* " *megacephala*, *oblinita*, and 13 others.
5. *Lepito* " *rumicis*, and 13 others.
6. *Pharetra* " *auricomma*, *orientalis*, *menyanthidis*.
7. *Triaena* " *psi*, and 20 others.
8. *Hyboma* " *strigosa*, and 2 others.
9. *Jocheaera* " *alni*, and 1 other.
10. *Mastiphanes* " 2 species.
11. *Merolonche* " 2 species.

The anomalies will be self-evident to all my readers. For instance, he places *americana*, which is little more than a gigantic race of *aceris* in a separate genus from that species; *aceris* (*Cuspidia*) itself, he places with *euphrasiae* and others of the *Viminia* group in *Arctomyscis*. In *Apatela* he places *megacephala* (a *Cuspidia*), with *oblinita* a *Viminia*, and so on. Truly, Mr. Butler's peep into Mr. Abbott's unpublished work has made confusion rather worse confounded. I admire Mr. Butler for owning, in 1893, that he knew nothing of the matter when he wrote his paper in 1879, and shall look forward earnestly to Mr. Butler's paper on the subject in 1907.—J. W. TUTT.

NOTE ON *ANTHERÆA MYLITTA*.—In the spring of 1894, I had a few

pupæ of this silkworm; one or two died, but, with a single exception, the rest emerged during the summer and autumn of that year. The emergence was spread over the whole summer and autumn, and when winter came there was still one large heavy cocoon from which no imago had been disclosed. Though I had never before met with an instance, it is not, I believe, unknown for a Saturniid to go over a second year. The curious thing is that when I cut the cocoon open to make sure of the pupa being still alive, I found a large female pupa, fat and healthy, but reversed in the cocoon—that is head downwards, with the last segments towards the point of emergence. It was easy to see that the pupa could not reverse itself in the cocoon; possibly the larva had been mystified by the cocoon having been taken down as soon as it was spun, and laid flat, or reversed. Had the abnormal position anything to do with the delayed emergence? In spite of the pupa being kept in the opened cocoon in a dry room indoors, a fine dark moth emerged successfully on August 5th, 1895.—T. A. CHAPMAN, M.D., Firkbank, Hereford.

## CURRENT NOTES.

Mr. Morris records *Plusia moneta* from Reading, and Mr. Phipps the breeding of the same species from larvæ found at Tunbridge Wells, whilst Mr. Thellusson records 15 *Sphinx pinastri* imagines from Woodbridge (Suffolk), and the same entomologist has 100 larvæ feeding.

Mr. W. Harcourt Bath's paper (*Entom.*, Sept.) on "The Origin of the European Rhopalocera," may be summarised as follows:—(1) Tropical America was the cradle of butterflies, *because* 5,000 out of 10,000 known species now exist there. (2) Butterflies had got from Tropical America to the Alps, Pyrenees and Carpathians, before the Glacial Epoch. (3) Such butterflies as there were, were driven south by the ice, and were exterminated, or followed the ice back when it receded. (4) Ernst Hoffmann considers that 173 out of 290 species of European butterflies came from Siberia, 8 from Africa, 39 from Asia. (5) The glacial species of butterflies ("the forms inhabiting the more northern localities and higher elevations on the mountains") are often of a darker hue. (6) Owing to the absence of austral species "the Sunny South of Spain" possesses fewer butterflies than Switzerland. The little bird over my shoulder propounds the following:—(1) How did the butterflies get from their Garden of Eden in Tropical America to the Alps, Pyrenees and Carpathians? (2) Since Mr. Ernst Hoffmann has already suggested the origin (?) of 220 out of 290 European species, what has Mr. Bath added to the discussion, or has he forgotten to tell us about the other 70? (3) What proof has Mr. Bath that the "glacial species," as defined by himself, are generally melanic? (4) Is Mr. Bath aware that the genus *Erebia* (which is about the only genus satisfying his definition) is, according to Scudder, Chapman, and our best authorities, probably one of the most recently evolved genera of butterflies, and by no means the original stirps" of Professor Weismann? (5) Does Mr. Bath not consider that the lumping of a flora into 6,000 feet in altitude (a day's comfortable climb), equal in extent to a flora extending from "Sunny Spain" to the North of Scandinavia, may have something to do with the preponderance of species in the Alps, Caucasus and Pyrenees? We await, with some interest, other cogitations of this kind. Theory, we know, but we want facts to support it.

Mr. G. T. Porritt describes (*E. M. M.*, Oct.) the larva of *Boarmia consortaria*, of which he says there are two main forms; one of these has the ground-colour a pale glaucous-green; in the other the colour is brown, yellowish or greyish, strongly marked or marbled with dark brown or red-brown. The larvæ hatched on June 24th, 1892, and fed well on oak, birch and willow, some of them being almost full-grown by August 3rd. By August 23rd nearly all had disappeared below the surface of the ground, and the moths began to emerge on May 16th, 1893, and continued to do so till nearly the end of July.

It is not often that two first-class collections of essentially few insects are sold in one month, but such is to be the case in November. The remainder of Mr. F. W. Wheeler's collection will be brought to the hammer by Mr. Stevens, on the 11th, whilst on the 19th that of Mr. W. Farren will be sold. The latter contains unparalleled series of *Papilio machaon*, *Bryophila impar*, *Nonagria neurica* (*arundineta*), and the genus *Anticlea*, the series of *sinuata* being superb, as also are the melanic *Venusia cambricaria*.

## VARIATION.

A PALE VARIETY OF *HADENA PROTEA*.—As I was sugaring, on Sept. 20th, I noticed an insect at rest on the garden wall, which at the moment appeared to be a rather small, darkish *Xylina ornithopus*. On setting it, however, I found that it was a variety of *H. protea*, in which there was no trace of green. The fore-wings are cream-coloured, with black and pale ochreous-brown markings, the latter chiefly towards the base and before and behind the stigmata. The thorax and body have similar coloration. The hind-wings are like those of the type, but paler. The specimen is a male, and is in perfect condition.—W. S. RING, M.D., Buckerell, E. Devon, Sept. 27th, 1895.

## NOTES ON COLLECTING, Etc.

### The Exchange Club.

The "Record Exchange Club" has recently re-awakened into more vigorous life, and I owe an apology to many subscribers for not answering their letters relating thereto, and for not fulfilling their request to send copies of the rules. To tell the truth, there never have been any copies of the rules, except those fastened in each of the circulating baskets. It may be well here to point out the advantages of the system to those of our subscribers who are not yet members. Each member has his own box in the basket into which he puts his *Duplicates*. He selects from the other boxes his *Desiderata*, enters in a book that travels with the basket what he sends, and signs for what he takes out. He, therefore, need take out no damaged specimens, and such get returned to their owners. He can, by selecting a few of his wants from each box, obtain an excellent exchange from other collectors with whom individually he would probably fail to effect one. A does not want B's insects, B does not want C's, and C does not want A's—but C. wants B's insects, B wants A's, and A wants C's, hence an exchange is effected, and with



ten members in a basket this indirect system becomes much more valuable. A provincial collector can send specimens to be named. He can also make enquiries of other members, which will be answered in the note book. The member will see local forms of various species of which he did not know the existence, and so on.

The Rules are arranged for mutual protection and advantage. They are—

1. That the "Record Exchange Club" be instituted for such subscribers to the *Entomologist's Record* as can set insects well, and fulfil the other rules of the club.

2. That each member send only fine insects, with data attached (or entered in the book); that he initial all insects taken from other boxes; and carefully fill up the Table mentioned in Rule 3. [Very common species, unless very variable, are not admissible].

3. That each member fill up on each round the Table providing for the following:—(1) The entry of the number of insects returned in his own box, and the entry in the book of the names of an equal number of fresh insects to make up for those returned. (2) The entry of the number of insects taken from other boxes, and the entry of the names of an equal number of insects which he places in his own box (and 20 per cent. extra for a working surplus).

4. That no member take insects from other boxes until he has removed all insects returned to him from his own, and substituted an equal number of fresh specimens likely to prove useful to members.

5. That no member keep the basket for more than three clear days. If from home the member must leave instructions as to forwarding. [For this purpose each member must provide himself with a list of the names and addresses of all members in his Basket, and a list showing the order of each Basket will be printed in each number of the *Ent. Record*. Members must also publish notices, &c., through the *Record*, as the Editor can undertake no personal correspondence.]

6. That each member send, at once, to the Editor of the *Entom. Record* a postcard announcing the arrival of the Basket from Mr. —, and its despatch to Mr. —.

7. That each member shall carefully re-pack every box that he opens, to prevent damage, and shall also make himself responsible for the sufficiency of the packing in the Basket when it leaves him.

8. That the admission of members be in the hands of the Editor, who will satisfy himself, as far as possible, of the suitability of candidates for membership, and who will provide a box as vacancies occur. That no member leave the Club whilst indebted to the other members.

9. That each member pay an entrance fee of 1s. 3d. towards the general expenses of providing boxes, basket, &c., for each Basket of which he becomes a member.

10. That notes of general interest published in the Note Book may be printed in the *Ent. Record*.

The Exchange Club started as far back as February, 1890, so that its long life and present vitality show that it is appreciated by the members. Personally, I find that it has been of the greatest benefit to me, and such work as is attached thereto has been largely a labour of love. The flagrant abuse by occasional individual members of Rules 2 and 5, and the carelessness of other (usually excellent) members to satisfy Rule 6, have given the greatest amount of trouble and anxiety, but otherwise there can be no doubt the system has proved a great success.—J. W. TUTT.

**CHEBOCAMPA CELERIO IN A BOOK-CASE.**—An enclosed book-case is scarcely the locality that we should exploit for hawk moths, although strange entomological captures have, from time to time, been recorded, as, for instance, the *Catocala fraxini*, found in the last throes of death upon a mantle-piece of an empty room in an empty house. On Tuesday last, Mr. W. Fenn, of this town, upon raising a horizontal-lying book in the situation named, discovered it to be pressing down a fine female specimen of *C. celerio*, which was dead, but not yet stiff, and only very slightly injured on the thorax. The finder has

liberally added it to my collection.—SYDNEY WEBB, Maidstone House, Dover, *Sept. 15th, 1895.*

*SPHINX CONVULVULI* AT BOURNEMOUTH.—Up to the present, twenty-three specimens of this moth have been taken here.—W. G. HOOKER, Bournemouth, *Sept. 10th, 1895.*

*THYATYRA BATIS* IN AUGUST.—On August 19th I saw a specimen of *T. batis* on sugar. The insect was in excellent condition, with the exception of a small cut in the right-hind wing. Apparently it had only emerged about twenty-four hours.—ARTHUR LOVELL-KEAYS, Caterham.

LARVÆ OF A SAW-FLY IN SOMERSET.—A friend at Wellington has sent me specimens of a "grub," which appears by thousands on his willows. It is probably the larva of the saw-fly, *Nematus pavidus*.—W. MACMILLAN, Castile Cary, Somerset, *Sept., 1895.*

## NOTES ON LARVÆ, &c.

FOOD OF *EPHESTIA KÜHNIELLA*.—Flour and rice are the foods on which most of the specimens of *E. kühniella* have been bred in this country. Dr. Allinson's "Food for Babies" is the latest addition. Mr. J. A. Clark exhibited, at the meeting of the City of London Entomological Society, a box containing packets of the above food, from which he had already bred a considerable number of specimens, whilst pupæ were scattered rather thickly over the lid and round the edges of the box. After distributing a portion of the packages, Mr. Clark kindly gave me the remainder. There seem to be a large number of larvæ of various sizes and ages still feeding, and several moths have since emerged. The larva is a most interesting one, owing to the ease with which the sexual organs of the caterpillar can be examined.—J. W. TUTT, Westcombe Hill, S.E. *Sept. 13th, 1895.*

HOW TO OBTAIN LARVÆ OF *APAMEA OPHIOGRAMMA*.—I shall be much obliged if anyone can give me hints as to searching for the larvæ of *A. ophiogramma*—the date, hour of day or night, food-plant (besides the ornamental ribbon-grass, etc.).—W. B. THORNHILL, Castle Cosey, Castle Bellingham, Ireland.

If anyone wants to obtain the larva of *Apamea ophiogramma*, let him increase the quantity of ribbon-grass in his garden, and probably he will succeed. I have done so, and do not regret it, as I must have taken in all some 70 specimens. I was pleased to detect the female in the act of ovipositing—not, as I had always supposed, amongst the roots, but in the fold of faded leaves—close to the point—where the eggs are deposited in rows, according to the accommodation provided by the fold. I really meant to breed *A. ophiogramma* this year, but when the time came round I found that I could not deal with so large an amount of material. I found extensive traces of larvæ, which had cleared out the main shoots, and left the shells full of greenish frass, but these shoots were so entirely hidden by the unaffected shoots that they were difficult to find, and to rear the insect, I must have dug up the whole of my plantation, so I let them bide, and do not regret it. I took more than plenty, a fair proportion in decent order, and no stunted or crippled specimens.—(REV.) C. R. N. BURROWS, Rainham Vicarage, Essex. *July 16th, 1895.*

HOW TO BREED *BOMBYX RUBI*.—In October last year (1894), the

larvæ of *B. rubi* were plentiful on the moors. I collected over 200, and put them into two large boxes placed out of doors; each box contained five or six inches of *Sphagnum* moss for the larvæ to hibernate in. As much rain fell in the autumn, the moss in one of these boxes got very wet, and all the larvæ in the wet moss died except five; but in the box which contained the dry moss there were only five dead larvæ; there is no doubt that the severe frosts which prevailed during January and February (we sometimes had as many as 34 degrees of frost at night) killed all the larvæ in the wet moss. I bred over 120 specimens from the larvæ in the box with the dry moss. I took several females out to the moors to attract males, but I got very few males, as I think the species was scarce this season. Most likely the severe frost killed many of the larvæ on the moors, as they are wet moors.—J. FINLAY, Meldon Park, Morpeth. July 22nd, 1895.

In October, a few years ago, I took a number of larvæ of *B. rubi*, and managed to rear all but two. The way I treated them was to get a large wooden box, which I filled half full of light earth, put a quantity of bramble leaves, etc., in, covered it with net, and put it in a cold frame in the garden. I did not look at it again till the middle of January. On turning the box out, I found all the larvæ just under the surface of the earth, and perfectly healthy. I then put each larva into a chip box, and placed the chip boxes on the kitchen mantelpiece. In ten days every larva had spun up and pupated, and in another fortnight the imagines were emerging in numbers.—L. S. BRADY, 17, Filey Street, Sheffield. Sept. 16th, 1895.

IN WHAT STAGE DOES THYMELICUS (PAMPHILA) THAUMAS HYBERNATE?—A little point with reference to the life history of *Thymelicus thaumas* wants putting straight. In *Entom.*, vol. xxv., p. 177, Mr. Hawes writes:—"It may be well to correct an error with regard to both *H. thaumas* and *H. lineola*, which appears to be accepted as fact. Neither species passes the winter in the larva state." In *Larvæ of Brit. Butterflies and Moths*, vol. i., p. 196, the Rev. J. Hellins writes of *T. thaumas*:—"The larvæ began to hatch on August 15th, and they soon spun their little ropes of silk across the blades of grass, &c." Which statement is correct?—J. W. TUTT, Westcombe Hill, S.E.

#### Notes of the Season.

HILDESHEIM.—*Apatura iris* and the red form of *ilia*, known as *clytie*, have been unusually abundant in the woods on the hill roads about two hours from Hildesheim. Although very difficult to capture, eight or nine specimens were netted on July 9th, while feeding on droppings on the wood roads, or resting a moment on the bushes fringing the paths. At least fifty were seen during the morning. While engaged in the exciting chase, the perspiration (from the exertion and the great heat of the day) starting from every pore, the hunter could not help remembering the charming paper on *Iris* in the April number of the *Record*, and wishing, with all his heart, that the talented author had shared the wild joy and deep despair experienced on the occasion. The specimen, which was *almost* in the net, was evidently so much fresher—just from the chrysalis—than the one really bagged, that the failure to catch it cast a gloom over all existence. One lovely *Iris* was struck by the ring of the net, and dropped in the grass, from whence it arose wildly, and, in less than half a second, had soared over the highest oak. One peerless beauty lost a good bit of one hind

wing in the struggle, but is otherwise so bright, that now, on the setting board, with the damage covered up for the moment by the paper strip, it reconciles one to this sad life. In this locality it appears to be a "good year" for *iris*, in fact for Lepidoptera generally, the season improving as it advances, and July being much better than June, which, on the whole, was a disappointing month for the butterfly collector, owing to cold and rain. — A. RADCLIFFE GROTE, M.A., Hildesheim.

RAINHAM.—My theory as to the mild winter of 1893-1894 having permitted a large percentage of certain unusual insects to show themselves during the following season, has received a rude shock, for, after the more severe winter of 1894-1895, I am again pleased to welcome *Agrotis obscura*, not in such numbers as before, but in the most lovely condition. Other species with periods, have favoured me with their presence at sugar, *viz.*, *Apamea unaninis*, *Dyschorista fissipuncta*, and *Apamea ophiogramma*. — (REV.) C. R. N. BURROWS, Rainham Vicarage, Essex. July 16th, 1895.

SOUTHAMPTON, NEW FOREST.—The early part of this season was remarkable for absence, both of larvæ and imagines, in this district. When hatching for larvæ of *Apatura iris* (which we did not get at all this year), the striking feature was the scarcity of even the commonest hibernating larvæ. I suppose the birds and the frost are answerable for this. *Boarmia abietaria*, which was fairly plentiful, was the exception to this rule. Six weeks later the oaks in the New Forest were full of larvæ, the same species that were common last year being there again in plenty, with the addition of *Asphalia ridens*. By the way, I may mention that *A. ridens* was one of the species which lay over last year in pupa with me. — J. C. MOBERLY, M.A., 9, Rockstone Place, Southampton. July 18th, 1895.

LYNDHURST AND WICKEN.—On August 11th I started with Mr. J. W. Corder, of Sunderland, for a fortnight's entomologizing at Lyndhurst and Wicken. We arrived at Lyndhurst Road Station at 9.33 on Saturday morning, in a very sleepy condition, but with great expectations as to the larvæ and moths that were awaiting our arrival. In this happy frame of mind we at once turned into the woods on leaving the station, and set to work vigorously. The first tree produced nothing, which we concluded was a mistake, but the next half dozen were no more productive than the first, which made us begin to feel uncomfortable; still we persevered, and soon every tree became extremely productive—but only of words which are not allowed to appear in the pages of the *Record*. By the time we reached Lyndhurst we had taken one small *Notodonta ziczac* (which appeared to be badly shaken), one *Hylophila prasinana* and one minute *Orgyia antiqua*, and had quite exhausted our vocabulary. However, the work had given us an appetite for dinner, and after performing that duty, we, in spite of a strong desire for a nap, started off again with renewed hopes. Directly we got on to the heath we took what had no doubt a very long time ago been a fine specimen of *Selidosema ericetaria* (*plumaria*), though, as it had very few scales left, and large pieces of all four wings were missing, we might have been mistaken. We also saw about three *Lycaena aegon*. Beating produced less than in the morning, and as it had now begun to rain, we got into our mackintoshes and sat down under a tree (which leaked badly) to talk the matter over. The verdict was that, though larvæ were apparently absent, we should get a lot of things at

sugar, and that, as it appeared to be shaping for a favourable night, we would start at once. So a little later we tramped down to our favourite ground, and put on a plentiful supply of sugar. On going round with the light we took one *Catocala sponsa*, and saw several *Amphipyra pyramidea* and *Calymnia trapezina*, so we went home to bed. The rest of our visit was little more successful, though, later on, sugar yielded some more *C. sponsa*, three *Noctua stigmatica*, one *Tryphaena subsequa*, one *T. fimbria*, and one *Agrotis puta*. We got absolutely no larvæ, and found that some one had already dug round most of the likely trees, and had only left a few pupæ of *Agriopis aprilina*, *Hybernia defoliaria*, and (ichneumonid) *Taenioctampa pulverulenta* for us. After our experiences in the New Forest, we arrived at Wicken without hopes of doing much better there, and, on going to see Mr. Houghton to arrange for a fen light, etc., we were met by another tale of failures. *Tryphaena interjecta* had not been seen, *Meliana flammea* only occasionally, and only a few of such insects as *Agrotis obscura*, *A. nigricans*, *Aplecta advena*, *Leucania imprudens*, etc., which generally occur freely. We had become used to getting nothing by this time, so merely emitted a few slight grumbles. It looked like being a good night for light, however, so we thought it just possible that we might get a few to set the next day—and we did! Directly it was dark, moths began to come, and until 1 a.m. we were hard at work boxing; indeed, our boxes were soon filled, and one of us had to sit under the lamp and bottle the moths as they were caught, returning the emptied boxes for fresh temporary inmates. The following is the list of that night's take:—*Viminia albovenosa*, *Tapinostola fulva*, *T. hellmanni*, *Coenobia rufa*, *Leucania phragmitidis*, *Helotropha leucostigma*, *Noctua rubi*, *N. umbrosa*, *Hydroecia micacea*, *Phibalapteryx vittata*, *Coremia unidentaria*, *Cidaria testata*, *Cataclysta lemnata*, *Paraponyx stratiotata*—all in numbers—beside six *Notodonta ziczac*, one *Cerura bifida* (presumably an instance of a 2nd brood, as it was a perfectly fresh specimen), three *Eugonia tiliaria*, two *E. fuscantaria*, and several *Arctia caia*, *Spilosoma fuliginosa*, *Cilix glaucata*, *Neuronion popularis*, *Charaæus graminis*, *Agrotis tritici*, *Epione apiciaria*, and other commoner species, including many Tortricides, which we could not accommodate. Houghton said they had not had such a night this year, so for once we went home satisfied. During the rest of our stay the nights were not so favourable; but moths generally came fairly well, even on clear nights, and before we left we took many more of most of the species mentioned above, and in addition, *Pterostoma palpina*, *Crocallis elingvaria*, *Strenia clathrata*, *Scotosia rhamnata*, etc. The "locals" seemed especial pleased with the abundance of *T. hellmanni*, *C. rufa* and *P. vittata*. Bats as well as moths seemed to appreciate our light, and we saw many moths ruthlessly snapped up by them. One, unfortunately for itself, made for a moth exactly as I struck at the same, and to its surprise found itself in my net. It got the moth first, however, but, as I got the bat, and the greater included the less, I suppose I got the moth too. I took the bat home, intending to see how many moths it had caught, but I had not time to carry out my intention. Sugar did not pay particularly well, but some nice things turned up, including fine specimens of *L. phragmitidis*, *H. micacea*, *N. umbrosa*, *Scoliopteryx libatrix*, *Plusia festucae*, etc. Only a few *A. tritici* put in an appearance, though this species usually swarms. In the lane, outside the fen, we

took *Cuspidia psi*, *Miana bicoloria*, *Caradrina alsines*, *A. nigricans*, *Tryphaena ianthina*, *Amphipyra tragopogonis*, *Catocala nupta*, *Calymnia diffinis*, *C. affinis*, *Pyrallis glaucinalis*, etc. There was nothing to do in the day-time in the fen, except to collect larvæ of *Papilio machaon* and *V. albovenosa*, both of which were swarming, and of all sizes, although the imagines of both species were flying in numbers. Larvæ of *Earias chlorana*, *Lasiocampa quercifolia*, *P. palpina*, *Pygaera pigra*, and *S. libatrix*, were beaten out of sallow, and those of *Choerocampa elpenor* were common in the ditches. As an instance of the way in which the professionals go about exterminating species, I may mention that one of them told me that last autumn he took 420 small larvæ of *L. quercifolia*, from which he this year bred two imagines!! Two visits to Tuddenham were productive of nothing special. *Aspilates ochrearia* was the only moth occurring plentifully, and there were a few *Agrotis vestigialis*, *A. tritici*, *Acontia luctuosa*, and *Hadena trifolii*. *Acidalia rubiginata* (*rubricata*) occurred sparingly, about a dozen being taken. The larvæ of *Dianthoecia irregularis* had been plentiful, but were unusually early, and although we made an attempt to find pupæ, none were forthcoming. We saw four *Colias edusa*, only one of which was captured; it was a fine fresh female at rest on a clover flower.—L. S. BRADY, 17, Filey Street, Sheffield. Sept. 16th, 1895.

## SOCIETIES.

The second August meeting of the SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY unfortunately fell on the night of the great thunderstorm. Mr. South exhibited smoky forms of *Rumia luteolata* from Macclesfield; Mr. Hall stated that he possessed similar forms from Scotland. Mr. West (of Greenwich), in exhibiting *Chrysomela gaettingensis*, taken this year at Bookham and Boxhill, remarked that he had never taken the species before. Mr. Turner: *Scodionia belgiaria*, from Oxshott and Shirley.—On Sept. 12th Mr. Jäger exhibited a melanic specimen of *Agrotis vestigialis*, from N. Wales, in which both fore and hind wings were black. Mr. Tutt: a number of cases of *Thyridopteryx ephemeraeformis* (or a species closely allied thereto), from the Argentine Republic; they were mostly cocoons of the vermicular female, and contained either eggs or young larvæ; he stated that the species had recently been reported as causing much damage in America. Mr. Adkin: a specimen of *Dianthoecia conspersa* (bred with others from N. Devon larvæ), which was of a rosy tinge; also a curious specimen (bred) of *Bombyx quercus* var. *callunae*, in which the outer half of each wing was devoid of scales, the fringes, however, being perfectly developed; also specimens of the wild British everlasting pea (*Lathyrus sylvestris*) from Eythorne, Kent. Mr. Tutt reported that he had taken a comparatively small number of *Zygaena exulans* in the Tyrol, some of which were of the Scotch form (var. *vanadis*), but that Dr. Chapman had taken a long and most variable series of the species at Andermatt, including all the forms described in the paper read to the Society last year. Mr. Enock exhibited, and described at some length, the Hymenopteron, *Trichogramma evanescens*, which is parasitic on the eggs of Lepidoptera, and is only 0.5 mm. in length. He remarked that the broods followed each other with marvellous rapidity, each brood maturing in about 14 days. The parasite did not confine itself to the eggs of

one species, but migrated from one to another, without compunction. He originally obtained the insect from the eggs of *Manestra brassicae*, but successive generations had been reared from *Tryphaena pronuba*, and other Noctuids. There seemed to be no limit to the number of broods possible in a single season, and the destruction caused by the parasite must be immense.

We have received reports of the proceedings of a new society, THE NONPAREIL ENTOMOLOGICAL SOCIETY, which meets at the King John's Head, Mansfield Street, Kingsland Road, its secretary being Mr. J. G. Craft. At the meeting on September 6th, Mr. Norman exhibited the following living Coleoptera, which he had captured at Enfield, and reported as being very plentiful in that locality:—*Dytiscus marginalis* (carnivorous), *Hydrophilus piceus*, *H. colymbetis*, and *H. acilius* (both herbivorous and carnivorous). Mr. Raine showed a preserved larva of *Ephestia kühniella*, which he found in a tin of Dr. Allinson's food, webbed inside the food. Many of the members considered that the species was not British, but an importation. Mr. Jackson showed a very fine form of *Arctia raia*, which was of a uniform cream colour, with just a dark patch on each wing; it had been bred from a larva taken on Hackney Marshes. Mr. Craft exhibited *Cataclysta lemnata*, *Hydrocampa nymphaeata*, and *H. stagnata*, which he had captured at a pond at Woodford; he remarked that, although they were plentiful, they were not easy to capture, as, when once disturbed, they flew out over the water and settled in the roots of the rushes.—On September 19th, Mr. Newbery showed a specimen of *Vanessa urticae*, captured by him in a house at Camden Town, the whole of whose wings were of a dull leaden colour.

At a meeting of the NORTH LONDON NATURAL HISTORY SOCIETY, on August 22nd, Mr. Battley reported that sugaring was a failure just now, but that he and Mr. Rose had found grass stems productive on some occasions. Mr. Tremayne had only seen a single specimen of *Oryzophanus phloeas* this year.—On September 12th, Mr. Nicholson exhibited *Pseudoterpna pruinata*, bred from larvæ obtained in Epping Forest; in one specimen the space between the transverse lines on the right fore-wing was converted into a dark green band; also a specimen of *Calocampa vetusta*, recently bred from a larva obtained at Pwllheli. Mr. Tremayne: a specimen of *Pterostoma palpina*, taken in a train at Hackney Downs Station on August 2nd.—On September 26th, Mr. Gentry showed a specimen of *Plusia moneta* from Walmer. Mr. Hardy stated that he had been round the north coast of Ireland, and had observed that the Lepidoptera there were much richer in colour than here. Mr. Prout reported that he had captured *Leucania vitellina* at Sandown.

At the meeting of the BIRMINGHAM ENTOMOLOGICAL SOCIETY, on July 15th, Mr. R. C. Bradley stated that Mr. McLachlan had identified the fungus referred to at the previous meeting as *Empusa conglomerata*, a species found on *Tipulidae* in America and Germany, but which had not hitherto been observed in Great Britain. Mr. Wainwright said he had found several lots of flies similarly affected at Sutton, and had taken one specimen on the wing which developed the fungus on the way home. Mr. Martineau reported that he had seen a specimen on the wing at Bridgnorth, in which the fungus was well developed. Mr. Abbott exhibited *Macroglossa bombylifomis*, *Cymatophora or*, *C. duplaris*, *C. fluctuosa*, *Bisulcia ligustri*, *Tephrosia extersaria*, *Asthenia blomeri*,

etc., taken in Wyre Forest, at Whitsuntide. Mr. G. H. Kenrick: *Hadena genistae* from Kingswood; *Nola cristulalis*, *Melanippe hastata*, *Macroglossa bombyliiformis*, etc., from Coombe Wood, near Coventry. Mr. Bradley showed *Helophilus transfugus* and *H. frutetorum*, from Sutton Park, and remarked upon the unusual abundance of the genus there this year; he had never before taken *H. transfugus*, and had only taken a few *H. frutetorum*, but this year he had obtained good series of both species.—On August 19th the Society held its 100th meeting. Mr. R. C. Bradley exhibited a number of insects taken on Cannock Chase, at Whitsuntide, including *Leucorrhinia dubia* and other dragon flies; *Nomada ochrostoma*, *N. ruficornis*, *N. flavoguttata*, and other Aculeates; also the specimens of the *Solenobia*, which he and Mr. A. H. Martineau took at Wyre Forest, last Easter, and which Mr. C. G. Barrett had identified as *wöckii*, and as new to the list. Mr. A. H. Martineau showed the following Aculeates:—*Myrmica melanocephala* (1) from Sutton Park; *Anthidium manicatum* from Bridgnorth; also a series of *Crabro dimidiatus*, which he had taken at Sutton, together with the insects they had captured; these consisted of 4 specimens of *Dolichopus*, 1 *Scatophaga*, and 2 different species of *Anthomyia*. Mr. Wainwright exhibited *Syrphus annulipes* from Lynton, in N. Devon, and remarked that this species, which he found for the first time in this country last year, near Stroud, had now been taken in three widely separated localities.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY, June 4th, 1895.—Exhibits:—Mr. Bate: a specimen of *Rumia luteolata* from Brixton, which had brownish longitudinal streaks between the wing-rays on the right fore-wing. Dr. Sequeira: a short series of *Plusia chryson*, bred from larvæ from Chippenham. Mr. Hamling: a series of *Boarmia roboraria*, taken on tree-trunks and at sugar, in the New Forest, in 1894; he remarked that, out of thirty-seven specimens so taken, only one was a ♀. Mr. Fuller: four *Choerocampa porcellus*, taken last night at Hayes, Kent, flying round the flowers of rhododendrons. Mr. Cox recorded the capture by him of two specimens of *Pachetra leucophaea*, and a series of *Scoria lineata (dealbata)* on the hills, near Canterbury. Mr. Riches, remarking on the great abundance of larvæ at Epping Forest, said he had obtained a dozen *Trichiura crataegi*. Dr. Sequeira said that the sale of the late William Machin's collection had realised about £500, of which about £170 represented the amount realised by the "Micros"; some of the lots of the latter reached £5.

June 18th, 1895.—Exhibits:—Mr. Battley: a specimen of *Taenioecampa opima*, taken on a lamp at Clapton, about May 10th. Captain Thompson: specimens of *Amphidasys betularia* var. *double-dayaria*, bred from Halifax eggs, all of which produced the black form. Mr. Richardson: *Scoria lineata (dealbata)*; males of *Agrotis cinerea*; and some fine examples of *Pachetra leucophaea*; all from Wye, Kent. Mr. Prout reported that he had bred a specimen of *Noctua ditrapezium*, from a larva taken at Hampstead, in the spring. Mr. Oldham, and Rev. C. R. N. Burrows both recorded the capture of *Agrotis suffusa*, and *A. puta*, quite recently, and the latter gentleman stated that the case of *Epichnopteryx reticella* exhibited by him, on May 21st, had produced a male imago.

July 2nd, 1895.—Exhibits:—Mr. Bacot: several generations of *Selenia tetralunaria*, many of the specimens being remarkably fine and



large. Mr. Bloomfield : a somewhat variable series of *Emydia cribrum*, taken on Whit Tuesday, at Ringwood. Mr. Tutt referred to the unusual abundance this year of larvæ of *Cucullia chamomillae* wherever *Matricaria inodora* (corn feverfew) grows. Dr. Sequeira said that in his garden at Hackney, treacle, flavoured with tincture of valerian, proved twice as productive as that flavoured with rum or jargonelle pear. Mr. Richardson recorded the recent capture of *Erebia cassiope* in some numbers, and in fine condition, near Windermere; he had also taken *Nemeophila plantaginis* var. *hospita* in the same locality.

July 16th, 1895.—Exhibits :—Mr. Bate : a bred series of *Hypsipetes sordidata* from Lee; also some questionable specimens of *Tephrosia biundulata* and *T. crepuscularia*. Mr. Battley : a female specimen of *Saturnia pyri* from North Italy. He stated that some young larvæ bred from eggs deposited by this specimen were black, with red trapezoidal warts and short bristles; but after casting their skin for the second time they became pale green with yellow warts and long spatulate hairs. Mr. S. J. Bell : a long series of *Boarmia roboraria*, and a specimen of *Tryphaena subsequa*, both from the New Forest. Mr. May : a series of *Melitaea athalia* from Plymouth. Mr. T. Clarke : *Geometra papilionaria* and *Pericallia syringaria*, from the New Forest. Mr. J. A. Clark : full grown larvæ of *Saturnia carpini* from Wicken Fen; also a pair of pale-spotted *Argynnis paphia* from Brockenhurst. Mr. Bacot : a series of *Boarmia repandata*, bred from a dark female taken in South Wales; only one of these specimens was of the normal colour, all the others showing a strong tendency to become melanic. Dr. Buckell : larvæ of *Dianthoecia capsicola*, which he had found feeding in the seed-pods of a solitary plant of *Lychnis diurna*, in his garden; he had never captured the imago, nor had he heard of its occurrence so near the centre of London; in the Society's *London List* it is recorded from Clapton and Stamford Hill, and from the Hampstead and Highgate district, but not from any more central locality: also larvæ, 14 days old, of *Hadena contigua*, that were feeding well on knot-grass, which they took to in preference to birch; also an ichneumonid larva of *Biston hirtaria*, with the parasite, and read a letter from a gentleman who had actually seen the fly attack the larva. From this it appeared that the larva was hanging by a thread when the fly attempted to settle upon it. The larva endeavoured to keep it off by twitching itself about, but was finally overpowered. An examination with a lens showed two eggs deposited outside the larva, near the head, and a discussion took place as to whether this was the usual method. Rev. C. R. N. Burrows : *Leucania pallens*, *L. impura*, and *L. straminea* from Rainham. Mr. May stated that he had bred a ♂ *Smerinthus ocellatus*, which paired with a ♀ *S. tiliæ*, but the eggs proved infertile. Mr. Bacot stated, with reference to these eggs, that certain colour changes took place, which induced him to believe that the embryo actually began to develop, but failed to continue. Rev. C. R. N. Burrows said that he had taken a large number of *Apamea ophiogramma* flying over the ribbon grass in his garden, and that the eggs were laid in the shrivelled ends of the grass blades, from which he inferred that the larvæ, when young, were external feeders.

August 6th, 1895.—Exhibits :—Mr. Battley : series of *Miana strigilis* and *M. fasciuncula* from Clapton and neighbourhood, showing gradations in the former species from the ordinary grey-marbled form to var. *aethiops*, and both the red and the yellowish form of the latter.

Mr. S. J. Bell: two cocoons of *Saturnia pavonia*, in which the usual outlet was wanting; they were almost spherical in shape, and smaller in size than normal specimens. Mr. Bate: *Orthosia suspecta* and *Xylophasia scolopacina* from Dulwich Woods.

Aug. 20th, 1895.—Principal exhibits:—Mr. Clark: four *Cledeobia angustalis*, from the New Forest, including a female; also, from the same locality, three female *Epinephela ianira*, two of which were partially xanthic, and the third had a light tawny patch on the disc of each hind wing. Mr. Nicholson: a box of insects taken last July, at Pwllheli, N. Wales, which included a specimen of *Vanessa urticae*, with the yellow costal blotches strongly tinged with white; and a female *Bombyx quercus*, which approached var. *callunae* in colouring. Dr. Sequeira: a fine *Bryophila perla*, suffused with brown; a series of *Hypsipetes sordidata*, mostly very dark; and the Yorkshire form of *Gortyna ochracea*.

Sept. 3rd, 1895.—Principal exhibits:—Capt. Thompson: bred *Nonagria elymi* from Hornsea, Yorks; several of the specimens being very strongly suffused with blackish scales. Mr. J. A. Clark: a variety of *Vanessa urticae*, in which the large square black blotch on the inner margin of the fore-wings was entirely wanting, but the twin spots were abnormally large and almost coalesced; also a series of *Ephestia kühniella*, bred from Dr. Allinson's Food for Infants, and living larvæ and pupæ for distribution. Mr. Tutt: larva-cases and newly-hatched larvæ of *Thyridopteryx ephemeraeformis*, or a species allied thereto, an insect from South America, apparently closely allied to the Psychids. Mr. Bayne: *Heterogenea linacodes* from the New Forest; and a very sparsely dotted *Spilosoma menthastris* from Tottenham. Mr. Tutt also exhibited a storebox full of *Erebia aethiops*, which he had recently taken in the Tyrol.

## REVIEWS AND NOTICES OF BOOKS.

Professor Grote has done excellent service in summarising the general results arrived at by those entomologists who have recently given so much attention to the natural classification of the Lepidoptera. In his *Systema Lepidopterorum Hildesiae* (published Aug., 1895), he summarises the results obtained, dividing the Order Lepidoptera into Suborders, *Frenatae* and *Jugatae*. The former falls into the Superfamilies—*Papilionides*, *Sphingides*, *Bombycides*, *Agrotides*, and *Tineides*; the latter contains the *Hepialides* and *Micropterygides*. The superfamily *Agrotides* contains a number of what were once considered *Bombycid* families, and the *Geometridae* are given only family rank in this superfamily. On the whole the system is logical, and the paper is one that should be obtained at once by all our leading lepidopterists. One of the features of the entomology of 1895 will undoubtedly be the approach of the entomologists of the world to a natural working basis for the classification of the Lepidoptera. It is remarkable how closely the lines Professor Grote has adopted agree with those which we had ourselves previously formulated in a small book on *British Moths*, that we have written recently for Messrs. Routledge and Sons. The only important point of difference, apparently, is in our treatment of the *Platypterygides*, and the formation of a larger number of superfamilies. The four large quarto sheets are written in Latin, a vast improvement on German. Its cost is not stated, but is, we presume, trivial. We may add that the paper is so far up-to-date that

Dr. Buckell's timely suggestion in the *Ent. Rec.* (vol. vi., p. 258) for the adoption of the superfamily termination "ides" has been utilised.

Messrs. Friedländer and Sohn, Berlin, N.W., Carlstrasse 11, are publishing an International Zoologists' Directory. It is edited by the German Zoological Society, will consist of 740 pp., and contain 12,000 names and addresses. The publishers ask for the names of British zoologists, entomologists, and naturalists generally, to add to the work. The subscription is 10s. In England, Messrs. Swann & Co., Bouverie Street, E.C., are publishing a more modest directory, although on similar lines. The cost of this is nominal, 6d.

### bituary.

WILLIAM HENRY TUGWELL.—Born February 21st, 1881, Died September 20th, 1895.—Our readers will hear with the greatest regret of the decease of Mr. W. H. Tugwell, who succumbed, after a long and painful illness, on September 20th. To a very large number of entomologists this will be a great personal loss. For more than forty years Mr. Tugwell has been a keen collector of British Lepidoptera, and during the last twelve years he has been a most active and prominent member of the South London Entomological Society. For almost the whole of the latter period he has been a member of the Council; on several occasions he was vice-president, and in 1891 president of this well-known and important society. Only when his serious illness confined him to the house and compelled his absence, did he cease his close connection with the society, and even then his old activity repeatedly manifested itself in the exhibition of any recently-acquired entomological specimens which interested him, and which he thought would interest his fellow-members and old companions. An excellent type of the sturdy, self-willed Englishman, he was most conservative in his predilections, and he was no friend to the newer entomology, which he never attempted to understand. At the same time he was thoroughly imbued to the last with a whole-souled love of nature in the woods and fields. Not only was he a keen and earnest collector of lepidoptera, but also a field botanist of considerable merit. He has left no scientific work behind him save the life-histories of a few of the insects he so dearly loved; but by his death England has lost a true-hearted man, and many of us have lost an esteemed friend.

MAJOR J. N. STILL.—It is also with the greatest regret that we announce the death of this well-known lepidopterist. His decease occurred on the golf-links, when he was in the act of striking the ball, and his sudden death will come as a great shock to a very large circle of entomological correspondents and friends.

PROFESSOR C. V. RILEY.—Entomological science has lost one of its foremost workers by the untimely death of Professor Riley, who was killed by a fall from his velocipede. As an old Surrey boy he was always interested in British entomologists, and never failed to attend the meetings of the Entomological Society of London when in England. So late as June last he was over here, and took part in the discussions at the meeting held on June 5th. Of his vast work it would be impossible to give even a short *résumé* [the titles of the papers (above 2,500) alone would fill a number of this magazine], but it remains a fitting monument to his great ability and industry.

# The Entomologist's Record

## AND

### JOURNAL OF VARIATION.

---

VOL. VII. No. 4.

NOVEMBER 15TH, 1895.

---

#### *Cerura bicipis* in Herefordshire.

By T. A. CHAPMAN, M.D., F.E.S.

This must always be one of our rarer moths; at least, it is very unlikely that large bags of it will ever be made, though it is quite possible that it may be domesticated like *A. alni*. Tilgate Forest has, I believe, at one time or other yielded large numbers by breeding or semi-domestication, and the species seems to occur over almost the whole of England. In Herefordshire it is now very rare, owing to the alder being a gradually disappearing tree. My hunts after *C. bicipis* have almost always been after the pupæ, and though this is a most unremunerative search, it serves as an excuse for a winter constitutional when one would not take one without some such real or imaginary object.

The total proceeds in moths have been very small indeed, so much so that both Dr. Wood's captures and mine have failed to complete his series, all Herefordshire specimens, since Dr. Wood regards a non-Herefordshire insect with the same kindly feeling that the average lepidopterist bestows on a "continental specimen." Nevertheless one meets with a large number of empty cocoons of various dates, and it is from these that my knowledge of *C. bicipis* as a Herefordshire insect is chiefly derived. The rarity, even of the empty cocoons, has led me to suppose that many larvæ leave the tree altogether, and wander off in search of pieces of rotten wood or other suitable positions, wherein to pupate.

A freshly-spun cocoon (I have seen very few) has a different tone from the surrounding bark, and would, one would suppose, be easily seen; by midwinter, however, the tone differs very slightly, and afterwards there is little or no difference between the cocoon and the surrounding bark—the lichens, etc., which the larva raises to the surface of the cocoon in spinning it probably growing a little in the damp autumn weather. A cocoon a year or two old often strikes one as being certainly invisible but for the hole in it, and frequently also from the margin of the cocoon separating from the bark around, due to the stretching of this by the growth of the tree.

The emergence of the moth leaves a small opening at the upper end of the cocoon; when ichneumonised, the swarm of Chalcids (the commonest enemy) emerges by a smaller hole nearer the middle of the cocoon. More frequently than either of these, however, the cocoon has a large part of the front missing, unquestionably the work of birds,

and usually, I fear, showing that the *bicuspis* pupa has helped to make a meal for the feathered foe ; but sometimes I fancy that the cocoon from which the moth has safely emerged is torn open by the birds, either wantonly, in hopes that the moth may still be there, or more probably to find any other insects that may have sheltered therein.

There is no doubt that one actually sees *all* the empty cocoons that are on those portions of trees that are examined, and after allowing for trees not examined, and especially for those portions of trees examined that are out of reach and out of sight, the total number of cocoons for any one year, placed in the typical manner, cannot be very large. I can hardly believe them to be all there actually are, or to be sufficient to keep the species in existence over a bad year. No doubt the insect flies long distances. I have found cocoons where the parents must have flown several miles, and probably much more, and this, no doubt, will enable a comparatively small number of moths to keep a large district inhabited. In my experience it is rare to find a suitable group of alders without one or more empty cocoons ; equally rare to find more than about half a dozen. The duration of these empty cocoons is very various. They often look very fresh in the second or even the third year, and they entirely disappear in from three to six years, traces occasionally perhaps lasting longer.

The cocoons are much more easily seen on birch than on alder, as on the latter tree growths of lichen are usually worked into the surface of the cocoon, which makes it homogeneous with the bark. It is common to see empty cocoons that would be quite invisible but for the holes in them, and I once had the luck to see one that had been emptied by a bird, in a spot that I had looked over a week before, and seen nothing ; one on a birch tree in my own garden was similarly emptied by a bird before I saw it.

I have sometimes fancied that the larvæ preferred the south side of the tree on which to spin their cocoons, but I think this is very doubtful, as they occur in all aspects and at all heights, from close to the ground to 20 feet above it (detected in a felled tree). I have only once found a cocoon where it would be submerged during flood, and very rarely on trees whose bases are close to the water.

The last few trees at the top of a valley, if of the right sort, are frequently inhabited by *C. bicuspis*, as if the moth first arrived there from a neighbouring valley, or was loth to leave.

The age of an empty cocoon is difficult to settle, and I at first certainly thought they lasted longer than I now believe to be the case. In two or three instances where I have watched individual cocoons, they have become quite unrecognisable in four or five years, though some traces remain rather longer—a bit of the edge of the cocoon, or the central hollow scooped out of the bark. A recent cocoon is known most certainly by the freshness of the surface of this hollowed portion.

I once bred a native Herefordshire hen, and hoped to get eggs, but circumstances not being propitious, the moth began on the second evening of her existence to lay infertile eggs copiously. This habit is not uncommon in certain Notodonts and others ; a *C. furcula* which I took this summer, however, did not act in the same way. I found her one afternoon on a willow trunk, and put her in a jar with some willow to lay eggs. In three or four days, however, she only laid some 25 or 30 eggs. I concluded that she must be infertile, and

placed her on a tree trunk in the garden at full liberty, at dusk. A couple of hours later I found her *in cop.*, and she afterwards laid six or seven dozen fertile eggs, those first laid being, as I suspected, infertile.

The most remarkable circumstance about *C. bicuspis* in Herefordshire is its distribution. It occurs over the whole county except the north-eastern portion—that which for entomological purposes I call “Wood’s country.” This portion, including the Woolhope Valley and Valley of the Frome, possesses Silurian and earlier rocks, and a richer and more varied fauna and flora than the rest of the county, which is a monotonous stretch of Old Red Sandstone. My friend Dr. Wood finds this district wonderfully rich, especially in micros, and it is certain that did *C. bicuspis* occur there, it had often fallen to his net and pin. It is presumptuous of me to say so, as such confirmation is very superfluous, but I have also looked for it in that portion of the county, in very suitable-looking spots, without seeing a trace. In the rest of the county it occurs all along the Wye Valley, in the Valleys of the Lugg and Monnow and their tributaries. Its head quarters are assumed to be at Dinmore, where birch grows in large quantities; yet it is harder to find an empty cocoon there than anywhere else, and I have only once found a full one there. It also occurs in all parts of the upper Wye Valley, in Breconshire and Radnor, that I have examined, at Three Cocks, Builth, Rhayader, Llandrindod, etc. Alder is still so abundant in some of these districts, that the insect must be much more abundant than in Herefordshire.

As to the comparative abundance of *C. bicuspis* at Tilgate and in Herefordshire, I rarely meet with so many as a dozen empty cocoons in a day’s (*i.e.*, an hour or two) search, whereas I hear of 80 or 40 being seen in Tilgate in a day. On the other hand, on the only occasion on which I visited Tilgate, I could not see a trace of *C. bicuspis*, in a search which would probably have disclosed several empty cocoons in similar country in Herefordshire.

---

### On the Interbreeding of *Spilosoma mendica* and its var. *rustica*.

By J. W. TUTT, F.E.S.

With the addition to the British fauna of the dark varieties of *Spilosoma menthastris*, which were obtained in Argyllshire and Elgin last year, followed by the successful breeding of the same forms during the present season by various collectors, a healthy interest in this genus has again naturally manifested itself among British entomologists.

The fact that these dark *S. menthastris* have assumed more or less the smoky tint which normally characterises the male of *S. mendica*, leads me to refer to another paper by Mons. A. Caradja, whom I quoted so largely in my “Notes on the Variation of *Spilosoma mendica*” (*Ent. Rec.*, vol. v., pp. 185–189).

In *Societas Entomologica* (vol. x., No. 7, July 1st, 1895) Mons. Caradja gives further details of the results of crossing *S. mendica* var. *rustica* with the type form. It would appear that the male of var. *rustica*, as obtained in Roumania by Mons. Caradja, is somewhat whiter than the Irish form which we know by that name, being in fact more of the tint of the normal female. The writer, referring to

the experiments of 1894—the details of which I have already recorded in the article referred to—reminds us that he named the mongrel produce of the cross of a typical *S. mendica* ♀ with a var. *rustica* ♂—*standfussi*. This year, from two successful pairings of the same crossing, a much larger number of moths was obtained, and the result was surprising.

The first batch yielded three different and well-characterised forms of the male:—(1) The typical hybrid\*—*standfussi*—described as that “form in which the thorax, body and wings are alike mouse-grey (sometimes yellowish-grey or almost olive-green), being exactly intermediate between the dark smoky-grey of the males of *S. mendica*, and the milk-white of the males of var. *rustica*. The palpi, eyes and antennæ are black, the fore-feet yellow, as in the original forms. This form has only a few black dots, which in some specimens are reduced to a single point, on the fore-wings.” Twenty-four per cent. of the male specimens bred, we are told, belonged to this form. (2) A darker form, which comes nearer in colour to male *S. mendica*. It is, however, constantly of a distinctly lighter grey (often almost steel-grey) than the type, and is also distinguished from it by the sparser black dotting. This form, to which 38 per cent. of the males bred belonged, is called *mus*. (3) An extremely interesting light form, which approaches var. *rustica* in its peculiar light tint; the thorax, body and wings are of a uniformly pale dirty yellow colour. This form is called *clara*, and 28 per cent. of the males bred fall into this group. The remaining 20 per cent. form transitions between the three forms just described. These transitions must be numerous, for Mons. Caradja adds that he could select from his collection a series of 17 specimens, every one of which would have a different tint.

Quite another result was furnished by the second batch, which Herr Otto Habich, of Vienna, bred for Mons. Caradja. This batch yielded, almost exclusively, imagines, the males of which must be considered as genuine *standfussi*; they differ, however, considerably from the original specimens of this form, in that all the wings are strongly dotted, and also that the greater number have not the thorax and abdomen similarly coloured. One set of ♂'s has the thorax, another the abdomen, lighter than the wings. The latter show in many specimens a disposition to assume a lighter colour along the nervures and the outer margin (including the fringes). In three males the thorax, the discoidal cell of the fore-wings, as well as the outer margin of the fringes of all the wings, are as light as in the palest of the form *clara*; the remaining wing-area, however, is more or less thickly sprinkled with black dots. This rare form may bear the name of *mixta*. Both batches gave males and females in the proportion of 4 : 5. More than half the ♀'s of the form *standfussi* lack the yellow colouring of the anus, and these specimens resemble the females of var. *rustica*, whereas the examples with a yellow ring around the anus are not to be distinguished from female *mendica*.

The following points are then urged by Mons. Caradja:—(1) That the mongrel form from one pairing shows in every instance, in a general way, definitely and regularly similar markings. (2) That the male parent determines far more essentially the external facies of

\* We use this term with great hesitation, as the product of a cross between the typical form and a variety of the same species can scarcely be called a hybrid—the Darwinian term for a cross of this kind is a “mongrel.”

the mongrel than the female. He also repeats, with confidence, his previous opinion that var. *rustica* is the older race, that it was generally distributed during the interglacial, desert period, and that *S. mendica* arose later with the change of climate. Further, that var. *rustica* in part assimilated itself with the changed conditions, and in those localities, forming its present insulated area of distribution, maintained itself by better adaptation, as proved by its occurrence in Bergell, Roumania, Bucovina, the Caucasus—and I may add—in Ireland.

Where the two areas occupied by the type and the variety meet, Mons. Caradja thinks the mongrel form *standfussi* must exist naturally with the type and variety, since his crossing experiments prove that the males of var. *rustica*, and the females of *mendica*, procreate healthy descendants. In the neighbouring Carpathian mountains, our observer states that the type appears exclusively to occur, he having captured it at an elevation of about 900 metres. In the Roumanian hills, at 30–40 kilometres distance, he had, until this spring, only caught and bred males of var. *rustica*. He was, therefore, surprised, when he found in the box—in which he had placed female *mendica* and *standfussi* for the purpose of attracting wild males—besides 134 male *rustica*, 14 specimens, of which part were identical with the form *standfussi*, the other part with the form *clara*—without doubt, natural mongrels. A third form (9 individuals), with darker bordered, milk-white, or pale yellow-grey wing areas, was also taken. These, it will be observed, are the reverse of the form *mixta*, and hence the name *inversa* is proposed, and it is suggested that these have been developed by the crossing of the form *standfussi* with var. *rustica*. This point he hopes to clear up, with the emergence of the progeny of this year's insects, which he is now experimenting upon.

Mons. Caradja states that in the arid parts of Central France, isolated cases of male *mendica* assuming a light grey coloration, occur, which he looks upon as cases of reversion to the form *rustica*, which also was probably the earliest form of the species there. He believes that his facts point to var. *rustica* as a race undergoing extermination, and that its complete disappearance in the near future is very probable. We prefer to look upon it as simply developing over a greater area than hitherto into the form we now call *mendica*, and have but little doubt that long after *rustica* has disappeared as a variety or local race, it will exist as a recurrent aberration of the supplanting *mendica*, reverting to the original form.

In conclusion, we are told that the in-breeding of these mongrel forms has, so far as the pairing of (1) *standfussi* males and females (14 pairings), (2) *standfussi* with *mendica* (♂ and ♀), and (3) *standfussi* with *rustica* (♂ and ♀) (24 pairings), are concerned, produced in every case fertile ova, yet it is remarkable that the pairing of *rustica* ♀ with *mendica* ♂ only very rarely results in the production of living larvæ.

The observations of Mons. Caradja are of such interest that no excuse is needed for bringing them before our readers. The fact that var. *rustica* occurs in Ireland, that typical *mendica* is so generally distributed with us, and that a few years ago quite an excitement existed among our collectors who were breeding var. *rustica*, should certainly cause our Irish lepidopterists to bestir themselves to get some fresh stock, and when this is obtained, the previous experience of



Messrs. Porritt and Adkin, in breeding vars. of *S. mendica*, point to them as the men most likely to get some results worth comparing with those already arrived at by our Roumanian "brother of the net," Mons. Caradja.

### Varieties of Noctuides at Warrington.

By T. ACTON.

**HYDROECIA LUCENS: ITS VARIETIES AND SUB-VARIETIES.**—In the chapter on *Hydroecia nictitans*, and the sub-species *H. lucens* and *H. paludis*, in *The British Noctuae and their Varieties* (vol i., pp. 58–64), Mr. Tutt points out at considerable length the tendency of this (or these) species to form local races, not only in far distant localities and under different conditions of environment, but also in places comparatively near, where the different forms overlap and yet maintain their characters unchanged. Mr. Tutt informs me by letter that his experience of the last few years not only supports what he then wrote concerning these allied forms, but to a large extent has emphasised most of the important phases of the variation and occurrence, as also of the distinctness, of *nictitans*, *lucens* and *paludis*.

With regard to *paludis*, no stronger support of Mr. Tutt's statements is required than that of Mr. W. H. B. Fletcher (*Brit. Noct.*, i., p. 63), who writes: "I have bred a considerable number of so-called *nictitans* from larvæ found on the south coast, near Worthing, and they are all, without exception, the form *paludis*." My experience has been rather with the sub-species *lucens*, and here I can give Mr. Tutt's assertions as to its distinctness the most unqualified support.

Mr. Tutt (*Ibid.* p. 59) says that at Deal, *paludis* and *nictitans* overlap, whilst he further mentions several comparatively near localities (*e.g.*, the marshes about Rochester, and the woods near the same city) in one of which *nictitans* occurs, and in the other *paludis*, but where no overlapping of the forms takes place.

Here a similar phenomenon is to be observed, but on this occasion the two forms implicated are *lucens* and *paludis*. On one side of Warrington I have taken this year nothing but *paludis*—there have been no *lucens*; on the other side (on the Moss) I have taken *lucens*, but no *paludis*. Some of the *lucens* are exceedingly fine, and both series of captures fully justify the remarks Mr. Tutt made, and the conclusions he formulated some years ago.

The large size and distinct mottling of *lucens*, at once separate it from any *nictitans*, in all its forms of variation. These are, as pointed out in *Brit. Noct.*, i., p. 62, parallel to those existing in *nictitans*, and will bear repeating:—

1. Var. *pallida*, Tutt (*Brit. Noct.*, i., p. 62).—Both sub-varieties *pallida-flavo* and *pallida-albo* occur here, but are comparatively rare.

2. Var. *grisea*, Tutt (*Brit. Noct.*, i., p. 62).—This form extends through quite a range of ochreous until the specimens become almost brown, a parallel form to *paludis* var. *brunnea*. [For this ab., Mr. Tutt proposes the varietal name *brunnea*.] Of the paler form we get the sub-varieties *grisea-albo* and *grisea-flavo*, but our specimens always run more ochreous, with a reddish tint, than grey.

3. Var. *rufa*, Tutt (*Brit. Noct.*, i., p. 62).—This form, the parallel form to typical *nictitans*, is very finely developed here. We get the

sub-varieties *rufa-albo*, with white reniform; *rufa-flavo*, with yellow; and *rufa* itself with red reniform.

4. *H. lucens* (with red reniform) and its sub-vars. *lucens-albo*, *lucens-flavo*, are also remarkably beautiful, being large, deeply and richly coloured, finely mottled, with large prominent stigmata.

5. Var. *brunnea*, Tutt (n. var.).—"Of a brown hue, with a distinct ochreous tint, sometimes reddish centrally, with three sub-varieties, *brunnea-albo* (with white reniform), *brunnea-rufa* (with red reniform), *brunnea-flavo* (with yellow reniform)." Of this variety I captured a very fine lot of specimens.

Altogether my series of *lucens* bears out remarkably the conclusions arrived at by Mr. Tutt.\*

**HYDROECIA PALUDIS: ITS VARIETIES AND SUB-VARIETIES.**—Similar as in many respects are *H. lucens* and *H. paludis*, variable as are both species (or sub-species), and parallel as are their variations, yet they never overlap each other, nor do they cause the slightest confusion to a trained eye in their separation. The greater number of the specimens of *paludis* that I have captured are of the forms described by Mr. Tutt, but there is besides, a red form which was apparently not known to Mr. Tutt, and which might easily be mistaken by those not thoroughly conversant with both forms in nature for *H. lucens* var. *rufa*, although it rarely approaches the intensity in hue of that species, and the overwhelming tendency in *paludis* of the ochreous to supplant the red is well exemplified in the two brightest specimens of *paludis* which I have, and which are of a distinctly reddish-ochreous tint.

The type of *paludis* is exceedingly rare here; in fact, Mr. Tutt tells me that there is not one among a representative series that I sent for his inspection, but all the other forms described in the *Brit. Noctuae*, vol. i., pp. 63-64, are obtainable, and, in addition, the red form hitherto unknown to Mr. Tutt, is not uncommon.

It is remarkable how good are the characters pointed out by Mr. Tutt for this species (*Ibid.* p. 59), both as to the more pointed apex of the fore-wings, and the narrowness of the reniform. It is indeed rare to find in *paludis* even a trace of the inner edge of the reniform, which is so constant in *nictitans*, but *lucens* appears almost intermediate in this respect.

The varieties and sub-varieties which we obtain are:—

1. Var. *intermedia*, Tutt (*Brit. Noct.*, i., p. 64), with its sub-varieties *intermedia-albo* and *intermedia-flavo*.

2. Var. *grisea*, Tutt (*Brit. Noct.*, i., p. 64), with its sub-varieties *grisea-albo* and *grisea-flavo*.

3. Var. *rufa*, n. var.—"Of a dull reddish tint, inclining to brown or ochreous; sub-var. *rufa-albo*, with white reniform; sub-var. *rufa-flavo*, with yellow reniform."—Tutt. I have before remarked that two specimens present an aberration of the ground colour of this variety, which is of a much brighter tint than is usually the case.

I may add that I have not yet observed a specimen of this form with a red reniform.

**CELAENA HAWORTHII AND ITS VARIETIES.**—In *The British Noctuae and their Varieties*, vol. i., pp. 107-108, Mr. Tutt does not give a short

\* I am indebted to Mr. Acton for the chance of inspecting a magnificent series of 90 *lucens*, and for the insertion of the description of var. *brunnea* above into his MS.—J. W. TUTT.

table of the varieties of this species in the same way that he does of the Agrotids and other difficult species, and which renders the detection of the varieties and sub-varieties of the various species a comparatively easy matter. Variable as is this species, it must be confessed that the variations are not at all easy to group and, with the exception of variation in the ground colour, to be concerned with matters so small and apparently unimportant, and connected by links so close that the difficulty must be very great.

In *The Brit. Noctuae*, p. 107, we read that the colour of *Celaena haworthii* varies from "yellowish brown, through deep red and purplish brown, to blackish grey." In this district we appear to get essentially two colour forms—red and purple. True, these vary somewhat in depth and intensity, and some of the darker point to a combination of red and purple, that makes them difficult to locate; but still, in a general way, these two forms present a somewhat parallel colour variation to that described in *Brit. Noct.*, vol. ii, p. 89, as characteristic of *Lycophotia strigula*, and which one is apt to connect with species attached to heaths, and which have obtained their peculiar hue owing to natural selection having developed forms which are protected by the similarity of their colours to those of the heath (*Calluna*) flowers.

The Warrington specimens, then, are essentially red-brown and purple. The orbicular varies "from complete absence to a clear white or ochreous spot," always, however, very small. The reniform is usually ochreous, the lower margin white, from which a geminated line runs towards the outer margin. There is, however, much variation in the number of white nervures, the geminated line at the base of the reniform being occasionally the only trace of them. We certainly do not appear to get the type, "the yellowish-brown" form, but our red form cannot be very far from *hibernica*, St., described at length in *Brit. Noctuae*, etc., vol. i., p. 108. The purple form runs off in its darkest specimens near to Eversmann's *morio*, as described by Mr. Tutt, but there is always a distinct purple tinge overlying the dark ground colour.

**DYSCHORISTA SUSPECTA AND ITS VARIETIES.**—In *The British Noctuae*, &c., vol. ii., p. 156, Mr. Tutt roughly groups the varieties of this species into the more unicolorous forms, and those that have a more or less *ophiogramma*-like appearance, i.e., a darker costa and blotch about the stigmata (extending as far as a pale transverse band parallel to the hind margin), and paler inner and outer marginal areas.

Various forms were abundant in this neighbourhood this year, and I appear to have captured most of the described forms. The more unicolorous forms were more abundant, but they had a very considerable range of colour variation. The main colours in the more unicolorous forms had, however, their parallel coloration in the more variegated forms. The var. *pallida* was not at all uncommon, nor was var. *congener*, but var. *rufa* was by far the most abundant form, showing, however, in many specimens a very strong leaning towards var. *laevis*. The dark var. *nigrescens* also occurred, but its sub-variety *nigrescens-variegata* was more rare than var. *variegata*. I have a few pale ochreous-red specimens, but these hardly come under Duponchel's *iners*, although they are nearer that than any other form described. I have, however, seen no specimens like those described from Pitcaple

by Mr. Tutt as being "almost pure ochreous." I am doubtful, too, whether the typical *suspecta* occurs here, but I have a few specimens very near var. *grisea*, although they are not altogether without a tinge of red.

From the above notes it will be seen that our Warrington specimens run very strongly in the direction of vars. *rufa* and *nigrescens*, and their sub-vars. *variegata* and *nigrescens-variegata*. Will not Mr. Dennis or one of the York entomologists work out their varieties of this species, and see in what direction the varieties run? Mr. Horne and Mr. Reid, too, might give us an excellent comparison with the Aberdeen specimens.

## VARIATION.

THE VARIETIES OF *LEUCOPHASIA SINAPIS* WHICH OCCUR IN BRITAIN.—Writing of the varieties of *Leucophasia sinapis*, Staudinger describes Hübner's var. *lathyri* as belonging to "the first brood, the posterior wings beneath being obscure greenish." I presume that a very large proportion of our British male specimens, captured in May and June, are of this variety. Dr. Lang, in his *Rhopalocera Europae*, converts this into "has the hind wings greenish instead of white," and says that "this form is met with in this country." It would be interesting to know whether any specimens agreeing with Dr. Lang's description exist in British collections, as they would present a remarkable appearance. That this is no mere slip is evidenced from the fact that the underside of this first brood is not "white." The second brood of this species, usually so rare in England, has a whiter ground colour, a smaller, blacker and rounder apical spot, and often, as Staudinger correctly says, has the "underside also white." The female has only faint traces of the apical tip, but such traces are usually there. The white-underside form of this second brood is the var. *diniensis* of Hübner. This, Dr. Lang describes as: "The dark marks are wholly wanting, the wings, both on the upper and undersides, being nearly pure white." Strange this, considering that the male has a very black apical spot. Extreme female forms of the var. *diniensis* are occasionally found without any trace of the apical spot, and become then, as Staudinger correctly says, "white on both sides." This is the ab. ♀ *erysimi* of Borkhausen. Lang seems to have overlooked the fact that it was a female form altogether, and diagnoses it as "having no dusky tips to the fore-wings." After this I shall not be much surprised at anything I may find in Dr. Lang's work, nor shall I be at all surprised to find our collectors of European butterflies with whole series of second-brood females under the name of *diniensis* and *lathyri*, and not a male of this brood among them.—J. W. TUTT. October 13th, 1895.

## SCIENTIFIC NOTES AND OBSERVATIONS.

ON THE PUPAL SUSPENSION OF *THAIS*.—In my paper on "Butterfly Pupæ" (*Ent. Rec.*, vol. vi., pp. 125–126) I gave an interpretation of this most unusual method of suspension of the pupa of *Thais*, derived from an examination of the pupæ. As this was at variance with the view taken by Prof. Scudder, who interpreted his observations in connection with the writings of certain continental authorities, it became desirable to put the matter to the test of actual observation, although Prof.

Scudder says that he thinks there is little doubt that my interpretation is sound. I have so far had no opportunity of making the observations myself, but being reminded that Mr. Nicholson had bred many specimens of *T. medesicaste* and some var. *honoratii*, I took an opportunity of asking him what his observations had shown. He writes from Lewes, September 25th, 1895:—"In reference to the pupa of *Thais*, I regret to say that, owing to some extent to my larvæ pupating when I have been travelling or collecting all day, I have never carefully watched the process all through. There is, however, no doubt but that what you state on pp. 125-126 of the *Ent. Rec.*, vol. vi., is correct, and that the 'nose silk' is merely the girth band caught up by the special appendages of the 'nose.' Out of a large batch of larvæ a certain proportion fail to shift the girth band, which then remains round the body of the pupa, as in *Papilio*, throughout the pupal existence. With others, again, the nose appendages fail to catch the band, and the pupa then hangs helplessly, supported by the pad of silk at the tail, as in the Nymphalids. It does not, however, look at home in this position. The shifting of the band is, I believe, effected by contortions of the pupa soon after the larval skin has been discarded. On two different occasions I have had upwards of 100 larvæ at the same time of *T. medesicaste*." Those who have tried to make careful observations on larvæ when travelling, or even to breed any larvæ at all under such circumstances, and still more those who, like myself, regard it as hopeless, and do not even attempt it, will not be prepared to make complaint that Mr. Nicholson did not watch the process all through. I think it is probable, though Mr. Nicholson does not hint that it is so, that to the jolting and other inconveniences to which his larvæ were probably subjected at critical periods, we owe it that he found so many unable to complete the suspension in a normal manner, and so illustrated the process by their failure, about as well as if they had actually been observed right through. It is improbable that any large proportion fail to catch the girth on the nose hooks under natural circumstances. This is, of course, merely my supposition, to be taken for what it is worth.—T. A. CHAPMAN, M.D., Fribank, Hereford. October 1st, 1895.

AN UNUSUALLY LATE EMERGENCE OF PHORODESMA SMARAGDARIA.—On August 31st I went down to the Essex marshes for the larvæ of *P. smaragdaria*, and found them very abundant—two of us getting many examples in a short time. Among them I noticed one which seemed nearly full-fed, being altogether different in size from the rest. This one pupated on September 4th, on the side of a cage in which I had temporarily placed the larvæ. It made a very slight cocoon, so slight indeed, that in a couple of days the pupa fell through and hung down, suspended only by the anal hooks. The pupa was put into a glass-bottomed box, and taken indoors. The weather being very hot, I breathed each morning and evening on the inside of the glass to keep a somewhat moist atmosphere. In about ten days I noticed a change, and the green colour of the insect was soon seen through the pupa case. On the 26th, between 8 and 9 a.m., the perfect insect emerged a somewhat small male. This is, I believe, an unique occurrence as regards this species, the imagines of which have hitherto invariably been bred in the spring. Did the larva belong to this year's ova, and was it so favourably circumstanced as to feed up rapidly and forego

the usual hybernation of the species? or was it a larva which through misfortune was compelled to lengthen out its feeding stage until the autumn? Mr. Auld, some time ago, exhibited at the South London Entomological Society, a larva of this species which had so gone over the summer, and stated that several of the others he had taken the previous autumn had done the same. He was not, however, he tells me, successful in breeding the imagines from these. Perhaps others who have bred the species would relate their experiences, as it would be interesting to know if this fact has been noticed before. Personally I am much of the opinion that the larva I found was one that had prolonged its larval stage, and not one which had hurried up. It is a very lethargic and slow-feeding species, often staying on the same spot for days, and is very seldom seen stretching out its head in the usual fashion of Geometers. If it does sway the fore part of its body, it is in the early morning, when the sun shines directly upon it, and it is then I judge that it eats the little it seems to require. All those species which have produced two broods in a season are, even when they hibernate as larvæ, active, and eat rapidly and very freely.—HY. J. TURNER, F.E.S., 13, Drakefell Road, St. Catherine's Park, S.E.

EUPITHECIA SUCCENTURIATA AND *E. SUBFULVATA*.—*Eupithecia succenturiata* occurs here sparingly but does not vary, and I have never seen an *E. subfulvata* here. I intend to try for the larvæ of the former in a few days, and if I breed it, will note the results.—T. MADDISON, South Bailey, Durham. *September 13th, 1895.*

I have never taken in this neighbourhood a specimen of *E. succenturiata*, but I have bred *E. subfulvata* and its var. *oxydata* every season for the last 10 or 12 years, from larvæ which I collect from yarrow (*Achillea millefolium*) and tansy (*Tanacetum vulgare*), in October. I have never seen a specimen of *E. subfulvata* approaching in the slightest *E. succenturiata*. The specimens of *E. subfulvata* which I have bred are much larger than any specimen of *E. succenturiata* that I have seen. I find the best way to take the larvæ of *E. subfulvata* is to look over the yarrow after dark, with a lamp.—J. FINLAY, Morpeth. *September 17th, 1895.*

The remainder of the pupæ mentioned in my note (*ante*, p. 43) yielded *E. subfulvata*. I am taking the larvæ on the same tansy plant now, and will send a further note anon.—RICHD. FREER, M.B., Rugeley. *October, 1895.*

SCOPARIA ATOMALIS FROM ESKDALE.—The *Scoparia* that I took in Eskdale, in 1887, which I suppose to be *S. atomalis*, is certainly very like a small *ambigualis*, but the costa is more rounded, the fore-wings slightly narrower, and the elbowed line less indented than in normal *S. ambigualis*. The hind wing, also, is more hollowed out on the hind margin.—H. H. CORBETT, M.R.C.S., 19, Hallgate, Doncaster.

COLIAS EDUSA: WILL MR. FROHAWK EXPLAIN?—I was recently looking up the description made by Mr. Frohawk of the egg of *Colias edusa* (*Entom.*, xxv., 202-203). In describing the egg, he remarks: "When first laid it is of a yellowish pearl-white, gradually becoming deeper in colour, approaching creamy-yellow. When about twenty-four hours old it assumes a light copper-pink hue, from which it gradually deepens into a rosy orange-pink, the high lights glistening with blue, the orange colour showing in shadow." Again, in describing the young larva, Mr. Frohawk writes: "It then measures  $\frac{1}{8}$  of an inch in length,

and is of pale ochreous or olive-yellow; the head black; both head and body are covered with short club-shaped spiracles, the club formation being at the apex; the longest and finest are situated on the anal segment, those on the head being extremely short but strongly clubbed." A caterpillar has nine pairs of spiracles placed on the sides of certain fixed and well-known segments. It would appear that *C. edusa* has "club-shaped spiracles" covering its "head and body," and that "the longest and finest are situated on the anal segment." The young larva of *C. edusa* with these marvellous "spiracles," and the egg with "the high lights" and "light copper-pink hue," must be remarkable natural objects. Will Mr. Frohawk explain these peculiarities, if there be an explanation?—J. W. TUTT.

### CURRENT NOTES.

Mr. Piffard calls attention (*E. M. M.*, Oct.) to a peculiarity of Aldeburgh, which can hardly be included among the attractions of that pretty seaside town. This is "the presence in vast numbers of a small species of gnat, which is always busy indoors and out of doors, in shade, and even in bright sunshine, in inflicting a bite which has such a virulent effect on those unacclimatised, that but few hours elapse before each new arrival has the 'mark of the beast' set on him." The inhabitants know the pest by the name of "The Norway mosquito," and believe that it was introduced by a particular yacht which used to ply between Aldeburgh and Norway. Mr. Austen, of the British Museum (Natural History), has identified the insect as *Culex dorsalis*.

Mr. J. C. Rickard contributes to *The Entomologist* for October some observations on *Plusia moneta*. Between May 28th and June 3rd, 1895, he found two larvæ and six pupæ. The imagines emerged therefrom between June 8th and 29th, and imagines were captured on June 29th and 30th and July 10th. Eggs laid by the moth captured on June 30th yielded larvæ on July 11th. One of these larvæ commenced to spin on August 11th, and the imago emerged on August 29th. Mr. Rickard believes the larvæ to be cannibals. The cocoons, which are nearly as yellow as those of *Bombyx mori*, are placed on the underside of a leaf of the food-plant (monkshood) without bending or warping it. The species is double-brooded, but the only example of the second brood that Mr. Rickard knows to have been taken in the wild state was one captured by himself in September, 1890, at Cambridge. Mr. Rickard is in error in stating that no specimen is recorded from Essex, as Mr. Oldham exhibited both at the City of London and South London Societies in July, 1893, a specimen captured by him at Woodford on June 2nd in that year.

*The Entomologist* for October contains records of the capture of *Sphinx convolvuli* during the present autumn at Alnwick, Wrentham, Milford-on-Sea, Bournemouth, Sidmouth, Tunbridge Wells, Aberdeenshire and Epsom.

Mr. D. Chittenden records (*Ent.* Oct.) the capture at sugar of a specimen of *Leucania albiguncta*, near Ashford, on August 24th.

### NOTES ON LARVÆ, &c.

ON HYBERNATING THE LARVÆ OF PHORODESMA SMARAGDARIA.—My experience of hibernating larvæ of *P. smaragdaria* is, so far as I can

judge, quite as unsatisfactory as that of others, who are apparently handicapped in having to supply the larvæ with substitute food. My plan is to keep the larvæ in a potted plant, covered with a muslin (calico in continued bad weather) bag; but as the plant does not thrive, particularly when potted away from the saltings, a frequent change becomes necessary, with the result that many larvæ are lost. In this way, I consider, I lose quite 60 per cent. of my larvæ; the death rate does not exceed 10 per cent.; perfect insects reared, 80 to 85 per cent. I have no compunction in taking the larvæ freely (I have a very large number at the present time), knowing how well they are protected and how abundant they are in one or two favoured saltings. It is very different with those of *Clisiocampa castrensis*, a conspicuous larva, which is, I fear, likely to disappear from this part of the world.—F. G. WHITTLE, 3, Marine Avenue, Southend. *September 21st, 1895.*

HOW SHOULD LARVÆ OF *AGROTIS ASHWORTHII* BE HYBERNATED?—I should be glad if anyone can give me any information as to the best mode of hybernating larvæ of *Agrotis ashworthii*. I bred some fine specimens of this insect in July last, and succeeded in obtaining fertile eggs from a pairing. The larvæ hatched about the third week in July, and are nearly an inch long. I fed them till a few days ago in tins (on willow), and they had up to that point done well; then some of them ceased feeding and died. I at once sleeved out the others, and so far they are all right, but I am very doubtful whether they will survive the winter in a sleeve, and I should be very grateful of any hints from anyone who has bred the insect, or any analogous insect. My attempt to force on the larvæ failed entirely.—T. A. MADDISON, South Bailey, Durham. *September 16th, 1895.*

Knowing that Mr. Porritt had once got a brood of larvæ through the winter, we wrote to him for a note thereon, considering that his experience might prove of general interest. He very courteously writes (Oct. 12th, 1895):—"I am afraid a note from me on wintering the larvæ of *Agrotis ashworthii* would be of no value, because the only time I attempted to rear the species I bred no moths. I did, however, get a pretty large brood through the winter, but the larvæ all died off in early spring. . . . Mr. Brady, of Sunderland, by forcing, got a second brood of the moth out in the autumn, and if I had some now, I should try and do the same. But if too late for that, I should put them in a roomy cage out of doors, but not exposed to rain, fill the empty bottom of the cage with dry dead leaves for them to hide among, but always have a supply of suitable low-growing plants in for them to nibble at during the winter, if they liked; just the way, indeed, that I treat most of my hybernating larvæ." We are quite sure no better advice than this can be obtained.—ED.

Though I have never tried to winter the larvæ of *A. ashworthii* myself, I believe the following plan, which I have found decidedly successful with other species, would prove to be so with it also. Procure a large, deep and strong wooden box, and put 6 or 8 inches of light, sifted earth into it. (The sifting is necessary to exclude earwigs and other depredators.) Then get a few small flower-pots, and fill them with roots of the necessary food-plant—the bulk of hybernating larvæ, including *A. ashworthii*, will eat knotgrass—and plunge them in the earth. As soon as the larvæ are nearly ready to cease feeding, turn them all out into the box, cover it closely with strong muslin, and



then put it into a cold frame if possible, or simply leave it outside covered with a sheet of glass, and do not disturb them again until either (1) some plant the larvæ will eat is obtainable, or (2) the roots potted off in the autumn are beginning to grow again. Then take the box either into a greenhouse or a warm room, and any surviving larvæ will soon be found feeding again. *A. ashworthii*, like most of its congeners, is easy to rear by forcing, and the only time I have had eggs I adopted that method, rearing about 50 per cent. By keeping in glass jars in a warm place—mine were put on the kitchen mantelpiece—a great part of the larvæ will feed up without any difficulty, and will emerge in November or December, a time when moths are, as a rule, “as welcome as flowers that bloom in the spring.”—L. S. BRADY, 17, Fife Street, Sheffield. *October 21st, 1895.*

HOW TO SUCCEED IN REARING *ACHERONTIA ATROPOS*.—As some collectors seem to have difficulty in getting moths of this species from the pupa, even when this stage has been attained successfully, I may be pardoned for giving a few simple details as to my treatment. After the lapse of a fortnight or three weeks, allowing time for the larvæ to pupate, the pupæ should be taken out, placed in cocoa-nut fibre, and deposited in the breeding cage, which may be a large flower-pot. Some emergencies may take place in November; if not the moths will remain in pupa till June or July, unless forcing be adopted. The un-emerged pupæ should now be placed in tins and well covered with cocoa-nut fibre, the slight amount of moisture necessary for the ultimate perfect development of the imagines being retained—as in no other way—by the tins. In the latter part of May the pupæ should again be removed to the breeding cage, and laid in moss, which may be gently syringed, especially if the weather be hot, and we may then shortly expect the moths. I noticed that the favourite time for emerging was between 7 and 9 o'clock in the evening, and after they had been treated to a shower-bath.—JOSEPH ANDERSON, Jun., Alve Villa, Chichester.

## NOTES ON COLLECTING, Etc.

*CATOCALA SPONSA* AT HASTINGS.—I have to record a second appearance of *C. sponsa* in the Hastings district, having taken a specimen at sugar on August 8th, at 10 p.m., during a heavy shower.—W. W. ESAM, Eagle House, St. Leonards. *September 28th, 1895.*

CAPTURES AT HYPHE.—During September and part of October, I captured a female *Eugonia autumnaria* (on a street lamp); also *Aporophyla australis*, *Xanthia gilvago*, *Polia flavicincta*, *Xylina ornithopus* (1), *X. semibrunnea* and *Polygonia c-album* (1).—W. DANNATT, F.Z.S., Ivy Dene, Westcombe Park, S.E. *October 5th, 1895.*

*COLIAS EDUSA* AT CHICHESTER.—*Colias edusa* made its first appearance this year in this locality, so far as my own knowledge is concerned, on July 23rd, when I saw a male flying in the garden. Two males were taken in a field of clover, not far from the house, on July 30th. I hoped that these gave promise of an “*edusa* year.” Soon afterwards, however, the weather unfortunately changed, and thunderstorms with heavy rain occurred, so that the “advance guard” of immigrants failed to establish any succeeding broods. Nevertheless, on August 8th, five more specimens were taken in the clover field, which we visited almost daily. No more were seen till

the 17th, when two males and two females (the first appearance of the latter) were captured, and a few more were netted in the third week of the month. One of the females is without the faintest indication of a spot in the marginal band of the hind-wings, and the spots in the band of the fore-wings are almost obliterated; it is nearly identical with a specimen in my long and varied series of var. *helice*. The marginal bands of the males differ as regards the intensity of the black, some being dusted with yellowish scales.—JOSEPH ANDERSON, Jun., Alve Villa, Chichester. *October 8th*, 1895.

CHOEROCAMPA CELERIO AT CLAPTON.—On September 7th, a gardener close by here brought me a very fine freshly emerged *C. celerio*, which he took at rest.—FREDERICK J. HANBURY, F.L.S., Stainforth House, Upper Clapton, N.E. *October 9th*, 1895.

CIRRHOEDIA KERAMPÉLINA AT SOUTHEND.—I think *Cirrhoedia xerampelina* must be well established in this district, for I found three examples at the foot of an ash—not on the trunk—early this month.—F. G. WHITTLE, 3, Marine Avenue, Southend. *September 21st*, 1895.

DECADENCE OF THYMELICUS LINEOLA AT LEIGH, ESSEX.—*T. lineola* has almost deserted its old quarters between Benfleet and Leigh. This is due to the Salvation Army colonists, who have brought many acres of land adjoining the river wall under cultivation, and have so made short work of the thistles. On one small untouched patch I was able to take 80 *T. lineola*, several *Herminia cribrella*, and one *Lithosia complana*.—IBID.

### Notes of the Season.

CLEVEDON.—In this locality the season entomologically has been a decided improvement on the last. Sugaring has been pretty good at intervals. Many insects, however, have occurred but sparingly, and some have been absent altogether. I took *Lithosia complana* in tolerable numbers on a rocky hillside near here, beating it out of some scrubby dwarf ash in the day-time. It is some years since I took the species, and then only a solitary specimen. I found it rather difficult to take on the wing, as its flight is much quicker than that of some of its congeners, and the locality was somewhat difficult to work. I did better by beating the low scrubby ash, which it appeared to like better as a resting place than other low shrubs close by. I presume the larvæ feed on a lichen, common on the hillside. *Sphinx convolvuli* made its first appearance at tobacco flowers last Wednesday, August 28th. The following evening I took a pair, and, with suitable weather, hope to make a good bag. I took my first specimen of *Eupithecia succenturiata* at Clevedon, on a gas lamp, at the beginning of July, but though I beat the thorn hedges in the neighbourhood, I failed to take any more. *E. subfulvata* we take sparingly at the flowers of *Clematis vitalba*, in August. I have *Xanthia citrargo* emerging now; the larvæ were taken last spring. I find the perfect insect drying its wings between 10 a.m. and 11 a.m. Is not this unusually early? I do not remember another instance of so early an emergence as this. Can any one tell me on what the larvæ of this species feed, before the lime unfolds its buds? I found them three-quarters grown when that took place last spring. Do the larvæ hibernate? My first specimen emerged about the middle of August,

and the box in which the pupæ were kept had been in the shade all the season. The pupæ of such autumn insects as *Hadena protea*, *Agriopsis aprilina*, and *Brotolomia meticulosa* have been tolerably plentiful. My friend, Mr. T. Greer, of Bath, tells me how common *Aplecta advena* was at the flowers of *Silene* this summer, in a field near Bath. They were, unfortunately, past their best when he discovered them, but he managed to take a few good specimens. A fine larva of *Acherontia atropos* was brought to me last week by a market gardener; it was almost full-fed. I have not heard that the imago has ever been taken in this locality, although both larvæ and pupæ are occasionally found.—J. MASON, Clevedon Court Lodge, Somerset. September 4th, 1895.

DONCASTER.—Sugaring continued good until the last week in July, when there was a great falling off. One of my last captures in July was *Agrotis obscura* var. *bigramma*. This is a very rare species here, and the only specimen that I have seen. Since then nothing of note has come to the sweets. Sugaring to-night (Sept. 5th), I found the autumn insects coming on, whilst some old friends of the summer still continue with us. The species seen were—*Asphalia diluta*, *Tryphaena pronuba*, *T. fimbria*, *Noctua xanthographa*, *Amphipyra tragopogonis*, *Anchocelis litura*, *Scopelosoma satellitia*, *Xanthia flavago*, *Calymnia affinis*, *Gelechia populella*, *Ecophora pseudospretella*, and *Endrosis fenestrella*.—H. H. CORBETT, M.R.C.S., 9, Hallgate, Doncaster. September 6th, 1895.

SEAMER MOOR.—I have recently had two or three days beating for larvæ on Seamer Moor, and secured a fair bag, including *Notodonta dromedarius*, *N. camelina*, *N. dictæoides*, *Cuspidia alni*, *C. leporina*, *Platypteryx falcata*, *Cymatophora duplaris*, *Amphidasys betularia*, &c., all from birch. I found oak most unproductive. Sweeping the heather produced larvæ of *Eupithecia nanata*, *E. minutata*, and *Anarta myrtilli*. *Angelica* (in the woods) gave larvæ of *E. trisignaria*. None of these larvæ, except the heath feeders, were at all plentiful. Sugar produced *Noctua dahlii*, *Dyschorista suspecta*, *Hydroecia nictitans*, and others, mostly in very fine condition.—T. MADDISON, South Bailey, Durham. September 13th, 1895.

WHITCHURCH, SALOP.—With me it has been anything but a good season, though it may be that for this the locality is to blame. Sugar has been a failure throughout, with the exception of one fortnight at the end of June and beginning of July, when moths swarmed at it, but were mostly of the commonest species. I counted seventy on one tree one night, but fully fifty of these were either *Xylophasia polyodon* or *Tryphaena pronuba*. Larvæ, too, have been far from abundant, with the exception of those of *Mellinia circellaris*, of which I took over a hundred one day from a single wych elm, and reared nearly all of them. I was glad to find among them a very few *Xanthia gilvago*, which has not hitherto, I believe, been taken in this district. *Pyrameis atalanta* is still very common, and shews a marked penchant for the sugared trees, as well as for fallen fruit. I have taken one *Grapta c-album* feasting on a fallen plum, and yesterday I saw a *Pyrameis cardui*.—(REV.) C. F. THORNEWILL. September 19th, 1895.

LEIGH DISTRICT, ESSEX.—*Lithosia complana* does not occur here freely. I generally get one specimen, rarely more, each season near the river wall; as also *Hydroecia paludis*, of which I get an occasional

specimen. The pretty little *S. reticella* has favoured me as usual, but not in such numbers as previously. Sugar is not paying at all just now. How different from last year!—F. G. WHITTLE. *September 21st, 1895.*

KESWICK.—The season here has been very good indeed, and I have been able to fill up several gaps in my cabinet. The following are a few of the insects I have captured: *Erebia epiphron* var. *cassiope*, *Sphinx convolvuli*, *Cymatophora fluctuosa*, *C. duplaris*, *Mamestra furva*, *Caradrina taraxaci*, *Celaena haworthii*, *Tryphaena fimbria*, *Noctua glareosa*, *N. triangulum*, *N. stigmatica*, *N. dahlia*, *N. umbrosa*, *Dyschorista suspecta*, *Xanthia fulvago* var. *flavescens*, *Epunda nigra*, *Aplecta prasina*, *A. tincta*, *Hyppa rectilinea*, *Lithomia solidaginis*, *Plusia interrogationis*, *Hyphenodes costaestrigalis*, *Agrotis agathina*, *Geometra papilionaria*, *Larentia salicata*, *L. olivata*, *Phibalapteryx vittata*, *Amblyptilia acanthodactyla*, *Platytes cerussellus*, besides hosts of common insects. Those who have read my list in the *Record* (vol. vi., p. 276) will see that I have taken several things new to the district. Sugar has been my chief mode of collecting, and I started out for the first time on June 19th. Anyone with plenty of time at his disposal might have done well, as insects have been plentiful in all stages.—H. A. BEADLE, 14, Station Street, Keswick. *September 23rd, 1895.*

COXHORNE, NEAR CHELTENHAM.—So far as my experience goes, this season is far superior to the last, in quality as well as quantity. I have taken some very good insects at sugar in my garden, such as: *Grammesia trigrammica* var. *bilinea*, several in poor condition, which I put aside for eggs, and have larvæ feeding now; *Agrotis obscura* (1); *A. simulans* (*pyrophila*); *Noctua depuncta* (8); *N. stigmatica* (4); *Xanthia gilvago*; *X. ocellaris* (1); *Plastenis subtusa*; *Epunda lutulenta*. One larva of *Acronycta alni* was found near the house, but unfortunately died. Of *Acidalia inornata* one specimen only was taken, in the wood near, which laid eggs and the larvæ are now feeding. In all, I have taken 265 species of "macros" within a short distance of my house. On the 18th I took *Noctua xanthographa* and *Tryphaena ianthina*, in cop. *Grapta c-album* occasionally comes to sugared trees, but is hard to catch. Ivy is now in bloom in a few places; from it I take some very nice forms of *Anchocelis pistacina*, also *A. litura*, *Orrhodia vaccinii*, *O. ligula*, *Scopelosoma satellitia*, *Mellinia circellaris*, and *Xylina ornithopus*. Light has been no good at all during the month: I have only taken a few *Luperina cespitis*, *Neuronia popularis*, *Gortyna ochracea* (1), *A. pistacina*, *A. lunosa*, *Tapinostola fulva*, *Xanthia fulvago*, *Thera variata*, *Cidaria miata*. Though I searched dozens of ash trees nearly every evening, from the middle of August to the middle of September, I only took one *Cirrhoedia xerampelina*, and that on September 4th, while out shooting.—(MAJOR) R. B. ROBERTSON. *September 25th, 1895.*

TENBY.—I was at Tenby from June 7th to 15th, and took a few *Leucania littoralis*, *Mamestra albicollis*, *Agrotis ripae*, *A. corticea*, etc., at sugar, as well as *Argynnis aylaia* (very early for this?), *Pararge egeria*, *Lycaena aegon*, etc., by day.—*IBID.*

BODIAM, SUSSEX.—The first fortnight in August was very unfavourable to collectors in our neighbourhood (near Bodiam), rain and cold winds prevailing nearly every day; so that I saw practically no day-fliers, and sugar was not much patronised by Noctuids. This was

particularly vexing, as the neighbourhood is new to me. I took *Platenis retusa*, but my remaining captures were only *Scoliopteryx libatrix*, *Tryphaena fimbria* (in fair condition), *T. ianthina*, *Catocala nupta* and *Mania maura*, and these occurred but sparingly.—W. W. ESAM, St. Leonards. September 28th, 1895.

CHATHAM.—In the neighbourhood of Chatham, during the three weeks commencing August 15th, I met with abundance of Noctuids of the usual kinds, and one specimen of *Drepana cultraria*. (Does this moth often come to sugar? I have never seen it before). The weather during this period was intensely hot, but again day-fliers were conspicuous by their absence. I only saw about half-a-dozen *Pyrameis atalanta*, a few *Lycaena bellargus*, and *Chrysophanus phloeas*, not very many *Coenonympha pamphilus*, and one *Colias edusa*. I am told that last year *Vanessa io* abounded in the valley that formed my chief hunting ground, but this season none appeared. Is this species becoming scarce in other places? I believe it has quite disappeared from the neighbourhood of Hastings—at least I cannot meet with anyone who has seen a specimen of late years. I was more successful with Coleoptera, for in the valley above mentioned I took a nice lot of *Harpalus sabulicola*, two *Licinus depressus*, numbers of *L. silphoides*, two *Staphylinus stercorarius* (under stones), a few *Harpalus rotundicollis*, *H. azureus*, and *H. puncticollis*, with some other species of *Harpalus* that I have not yet had time to identify. Sweeping was not very productive, as I took nothing but a few *Sermila palensis*, various *Thyamis*, which I won't attempt to name, two *Sitones crinitus*, one *Cryptocephalus pusillus*, and *Cychramus luteus*. I may add that the moth-trap was an utter failure, yielding only two *Crambus culmellus*, one *Cerastoma costella*, and one *Eupithecia oblongata*.—IBID.

WICKEN.—On June 17th, 1895, my son and I arrived at Soham at 4.58, according to precedent, and were conveyed by Mr. John Bailey to Wicken. The weather was warm but rather unsettled, and promised well. After tea we went off to greet Mr. Albert Houghton, who was expecting us, and to arrange for the work of the evening. His account of the season was most discouraging, and his boxes confirmed his tale. Except that *Macrogaster castaneae (arundinis)* had been met with more frequently than usual, the season had, so far, been a failure; sugar was hopeless. However, we hoped against hope, and persuaded him to sugar the drove, fen and lane, and at 8.45 we were on our way out. We soon found that he had not underrated the value of sugar. On this and the next two nights, we took nothing worth mentioning at sugar, except a few *Leucania impudens* (rather early for this, was it not?), *Apamea unanimitis*, and *Aplecta advena*. At light we had rather better luck. *Hermينيا cribrumalis* was abundant; *Nascia ciliaris* occurred in fair numbers; and besides these we took several *M. castaneae*, *Spilosoma urticae*, *Viminia albovenosa*, as well as some *Meliana flammea*, *Pterostoma palpina*, etc. We worked away until midnight, or later, and felt ourselves fairly rewarded. June 18th was brilliant, and very hot, so I went over to Tuddenham with Mr. Houghton, and there we had very good sport. *Acidalia rubiginata* was practically over, as also was *Lithostege griseata*, which had been unusually early this year; but we netted a large number of *Agrophila trabealis*, and *Heliothis dipsacea*, which are of a much lighter colour than those taken in the New Forest, and a few *A. rubiginata*, and *Acontia luctuosa*. *Eupithecia oblongata* runs to a

large size in this locality, and is especially finely marked. Before leaving Wicken I paid a visit to Mr. Solomon Bailey, and found that his experience of the season exactly coincided with that of Mr. A. Houghton, and my own experience in the New Forest having been equally disappointing, I resolved not to visit Wicken again this year. But the fates decided otherwise. The sudden and unexpected General Election called for my presence at Wicken, on July 26th, to record my vote, and it is needless to say that I made that the occasion of a fresh raid upon the moths. I only stayed for one night, but it was a perfect night—warm, dark and moist. Mr. Houghton did not flatter me with any hope of success, and indeed sugar was, if possible, worse than before. A few *Helotropa leucostigma*, and *Calymnia affinis*, were really all there were to take. The thing that struck me most was the extraordinary absence of common insects, such as *Agrotis segetum*, *A. nigricans*, *Noctua c-nigrum*. *Leucania pallens* and *Xylophasia polyodon*, which usually swarm at sugar, were each represented by only one or two specimens. At light matters were different, *V. albovenosa* simply swarmed. I took 50, and might have taken 150 if I had cared to stay for them, but as there was not much else I got tired of taking dozens of one species. A few each of *Coenobia rufa*, *Tapinostola hellmanni*, *Nascia ciliialis*, and *Leucania phragmitidis*, turned up, but little beside. Thus ended my experiences of Wicken for this year. The local collectors describe the season as the worst that they ever remember. *Agrotis obscura* had not been seen when I was last there, nor *Cidaria sagittata*. Mr. Houghton took one very fine *Hadena atriplicis*, which I have got, and several good specimens of *Trochilium apiformis*. By the way, *H. atriplicis* and *Acronycta (Cuspidia) strigosa* appear to be becoming increasingly rare; one or two specimens in a season are the most that are now taken.—J. C. MOBERLY, M.A., Southampton, Sept. 28th, 1895.

**SHETLAND.**—I have just returned from the Shetlands, where I spent nearly three months collecting Lepidoptera. The weather was as bad as it is made, but nevertheless I managed to get some fine things, among which I may mention a grand series of *Crymodes exulis*, varying from black, through brown, to orange. Each specimen, however, entailed on an average from 18 to 20 miles walking, many of the miles having the peat-mud over one's boots, and getting into the house frequently at 4 a.m., drenched through and through. Collecting *C. exulis* is not a treat!! I can now quite understand the dealers charging £5 a pair for them. They are cheap at the money. *Hepialus humuli* var. *hethlandica* was not uncommon, and many fine forms fell to my net. *Emmelesia albulata*, and var. *thule*, were to be had among yellow rattle, and towards the end of August I took a fine lot of the black form of *Noctua glareosa*, and the Shetland form of *Cidaria immanata*. *Noctua confusa* was to be had in fair numbers, but many of them very much worn. **TORTRICIDES** and **TINEIDES** were not in great numbers, but those that were taken were very interesting. On some nights *Noctua confusa* was very common on the sugar, whilst on other nights scarcely any would be seen. *Mamestra furva* was rare, and my experience of *Noctua glareosa* pointed to the fact that it appeared carefully to avoid the sugared posts, and to settle upon the wires between. It must be remembered that there are no trees in Shetland, so we have to sugar the posts, which are rather short, and

thus it will be understood that sugaring there is rather a "back-breaking" job, as, on some nights, I sugared a mile of posts.—J. J. F. X. KING, F.E.S., 207, Sauchiehall Street, Glasgow. Sept. 30th, 1895.

KINCARDINE, BRAEMAR, FORRES AND ABERDEEN.—Except during July, sugar has proved very attractive here for insects. June was fairly good on the coast, but in the woods it was utterly useless. Not a single *Hyppa rectilinea* turned up at sugar, although the species was about, as I found several at rest. July was good for day work, but not for sugaring. I tried it at Braemar, but only a few *Noctua festiva* put in an appearance. At the end of the month *Manestra furva* began to be attracted on the Kincardineshire coast; and since the first week of August, moths have swarmed in the woods. I started at Forres in company with my friend, Mr. Mutch. Our best captures were *Noctua depuncta*, *Aplecta occulta* (scarce), *Tryphaena subsequa* (getting worn), *Cosmia paleacea*, beautiful red and black vars. of *T. orbona*, *Epunda viminalis*, *Dyschorista suspecta*, *Noctua dahlia*, *Chariclea marginata* (very late?), *Xanthia fulvago* var. *flavescens*, and a host of commoner things. A week later, at Aberdeen, *Dyschorista suspecta* and *Lithomia solidaginis* were unusually abundant, and continued until their season was over. *Noctua castanea* was not quite so common as I have seen it in a good sugaring season. *N. sobrina* did not take to the treacle until it was well out and mostly worn. The common autumn insects, such as *Anchocelis helvola*, *A. litura*, *Mellinia circellaris*, have been, and still are, abundant. *Orthosia macilenta* is out at the present time in greater numbers than I ever saw it before. *Calocampa vetusta* and *C. exoleta* are both coming freely to the sweets. *Epunda nigra* is getting over, but it has been out a long time, and on some nights it was not rare; it is always a difficult insect to get in perfect condition—they almost invariably have a nasty chip which is not noticeable until one begins to set.—A. HORNE, Aberdeen. September 30th, 1895.

FOREST GATE AND FRESHWATER.—This season with me has not been a productive one. I have found sugar next to useless in my own neighbourhood the whole year through. I was staying at Freshwater (Isle of Wight), from the middle of August to the beginning of September, and it was not until just before leaving that I saw things in anything like abundance.—A. W. MERRA, Forest Gate. October 3rd, 1895.

PERTH.—Collecting in this district has been, on the whole, good, August being the only month so utterly wet as to stop all means of collecting. Noctuids have been fairly abundant. On one night last month I took, at sugar, 20 *Calymnia trapezina*, 15 *Noctua glauca*, 9 *Lithomia solidaginis*, 7 *Agrotis obeliscus*, and a few *Epunda nigra*. The following week a strange change occurred, 37 *Calocampa exoleta* falling to my lot, but no other species of insect being seen during the evening.—E. R. BUSH, 71, Strathmore Street, Bridgend, Perth. October 3rd, 1895.

SOUTH ARGYLLSHIRE.—Sugar has been tried at intervals in South Argyllshire throughout August and September; there were never many moths at it, generally very few.—W. M. CHRISTY, F.E.S., Watergate, Emsworth. October 5th, 1895.

MONTROSE.—Montrose is situated on the east coast of Forfarshire, and on the north side of the mouth of the river South Esk. All along the coast from here to St. Cyrus (about six miles

northwards), stretch the sand-hills, and it is here that most of my work has been done. This part of the coast is botanically very rich, especially about St. Cyrus, where some very rare plants are to be found, among them being *Dianthus deltoides*, *Silene nutans*, *Campanula glomerata*, *C. latifolia*, and *Veronica anagallis*, whilst *Vicia cracca* grows in abundance. On the south side of the river the coast changes, and in place of the sand we have high cliffs and rugged trap rocks, intersected with small bays. Inland the country is rather flat, until we reach the base of the Grampians, some fourteen miles off, and about there are several high elevations, of between 2,000 and 3,000 feet, which, no doubt, would produce some very good things, but up to the present I have not had time to work them. The district is fairly well wooded, but there is rather a dearth of oak trees. Sallows are plentiful, and, as a rule, very easily worked. I think there are few entomologists who work harder than Mr. Duncan and myself. Through March and April we are generally in the woods by 5 a.m., and if we do return home with perhaps only a couple of *Panolis piniperda* each, we try hard to be satisfied. I must say that our early morning excursions have been very disappointing, and I, at any rate, mean to give them up, as I don't think it is worth while to hunt around the tree-trunks on frosty mornings for the sake of a few *Larentia multistrigaria* and *P. piniperda*, notwithstanding the good old advice of the Rev. J. G. Wood, to "Get up early, and go round tree-trunks and palings." This year the sallows were very late, and our first expedition to them was on April 17th. Each taking a couple of sheets, 12 feet by 10, and packing them on our bicycles, we were soon at our work, and obtained any quantity of *Taeniocampa gothica* (a few var. *gothicina*), *T. stabilis*, *T. instabilis*, and a few *P. piniperda* and *Cidaria sufumata*. A week later *Pachnobia rubricosa* appeared, but these were not so plentiful as last year. On May 6th we went to Inglis-Maldis (eight miles inland), and on the heather caught a fair number of *Saturnia carпинi*, *Fidonia carbonaria*, *Bupalus piniaria*, and *Anarta myrtilli*. The sallows kept us busy until the beginning of May, when we changed our hunting ground to St. Cyrus, a splendid ground for *Lycaena astrarche* var. *artaxerxes*. Here we worked nearly every night for a month, combining the pleasures of netting and sugaring, and the following is a list of our captures: *Hepialus lupulinus*, *H. sylvinus*, *H. velleda*, *H. humuli*, *Spilosoma menthastri*, *S. fuliginosa*, *Odontopera bidentata*, *Choerocampa porcellus*, *Cabera pusaria*, *Larentia didymata*, *L. viridaria*, *Eupithecia lariciata*, *Melanthia ocellata*, *Melanippe montanata*, *Cidaria dotata*, *Eubolia limitata*, *Anaitis plagiata*, *Agrotis segetum*, *Noctua plecta*, *Hadena adusta*, *H. dentina* (very pretty forms), *H. thalassina*, *Dianthoeccia capsicola*, *D. conspersa* (very dark), *Azylia putris*, *Apamea basilinea*, etc. On June 10th I took one specimen of *Euchelia iacobaeae* on the wing at St. Cyrus. On June 29th I took a trip to Bervie, 12 miles north. *Lycaena astrarche* var. *artaxerxes* was very plentiful, also *Chrysophanus phloea*s. I also took three *Argynnis aylaia*, any number of *Zygaena filipendulae*, one *Nemeophila plantaginis*, and one *Euthemonia russula*. From June 17th to July 28th we confined ourselves to the sand hills close at home, occasionally taking a night off to the Craigs Woods (these woods are about four miles inland and very extensive, and it is here that the beautiful little *Linnaea borealis* grows) for *Hyppa*



*rectilinea*, but during this time sugar was an utter failure in the woods and we only got four *H. rectilinea*, and nothing else. Still, all this time, the coast was yielding splendidly, and we took the following in great numbers: *Leucania conigera*, *L. lithargyria*, *L. littoralis*, *L. comma*, *L. impura*, *L. pallens*, *Xylophasia rurea* (and var. *combusta*; also some very whitish forms), *X. lithoxylea*, *X. polyodon*, *Manestra albicolon*, *M. brassicae*, *Apamea basilinea*, *A. gemina*, *A. didyma* (in endless varieties), *Miana strigilis*, *M. literosa*, *Rusina tenebrosa*, *Agrotis vestigialis*, *A. segetum*, *A. exclamationis*, *A. corticea*, *Noctua augur*, *N. plecta*, *N. c-nigrum*, *N. festiva*, *N. rubi*, *Hadena adusta*, *H. dentina*, *H. oleracea*, *H. thalassina*, *Cucullia umbratica*, *Dianthoea conspersa*, *Chorocampa porcellus*, *Pyrrha umbra* (very plentiful), *Caradrina quadripunctata*; and now (July 28th), *Tapinostola elymi*, which occurs all over the sand-hills, was coming out, and the nights were hardly dark at all, so that very little could be done before 11 o'clock. *T. elymi* seems to be a very late insect; a few are seen early in the evening on the wing, but the greater number are found about 12 o'clock on the heads of the marram grasses, from which they can be easily boxed, and I find they travel very well in ordinary chip boxes. In the beginning of August sugar began to play up again in the woods, and kept us well employed until the end of September. Throughout August, *Dyschorista suspecta* and *Noctua dahlia* were out in hundreds, together with *Tryphaena prunuba*, *T. orbona*, *T. fimbria* and *T. ianthina*, *Noctua umbrosa*, *N. baia*, *N. brunnea*, *N. castanea* (and var. *neglecta*), *N. xanthographa*, *Xanthia fulvago*, *X. flavago*, *Mellinia circellaris*, *Agrotis praecox*, *A. nigricans*, *Lithomia solidaginis*, *Calymnia trapezina*. On the coast the ragwort was out rather early, and produced *Celaena haworthii*, *Miana literosa*, *Charaear graminis*, some fine varieties of *Agrotis tritici* and *A. cursoria*. September sugaring was decidedly good, and the following fell to our boxes: *Epunda nigra*, *Polia chi*, *Hydroecia nictitans*, *H. micacea*, *N. glareosa* (with a few of the black variety), *A. suffusa* (one of which is almost a mahogany brown), *Miselia oryzaanthae*, *Dichonia aprilina* (which has been fairly abundant this year), *Hadena protea*, *Calocampa vetusta* and *C. exoleta*; one *Anchocelis helvola* (I was greatly pleased to take this insect in Craigs Wood, because I have sugared here regularly for three years, and this is its first appearance); *A. litura*, the latter in great numbers, as in 1893—last year there were none; *Orthosia macilenta* (very abundant, but not varying from the type), *O. lota*, *Orrhodia racemii* and *Scopelosoma satellitia*. We have chiefly confined ourselves to the Noctuides, and on reference to my catalogue I find we have turned up 106 species thereof in the immediate neighbourhood. We have almost dispensed with rum, using methylated spirit instead. In a broom field, close to my house, I have taken several *Chesias rufata*, and *C. spartiata* is very common here in the autumn. On the whole, 1895 has been a splendid year, and almost every insect has turned up in great numbers, with the exception of *Hyppa rectilinea*, but I believe this has been the same everywhere, as Mr. Horne, of Aberdeen, tells me he has taken none this year. I wish to mention this particularly, because I made a lot of rash promises last year and I am not able to carry them out, so that I am afraid I shall disappoint many of my correspondents this autumn.—MONTAGUE GUNNING, M.D., The Mall, Montrose, N.B. October 5th, 1895.

## SOCIETIES.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY met on September 26th, 1895. Sympathetic references were made to the death of Mr. Tugwell. Mr. Adkin exhibited specimens of *Spilosoma menthastris* from Morayshire, the fore-wings of which were of a rich dark brown colour; also a specimen of *Carpocapsa pomonella*, bred from a walnut. Mr. West, of Greenwich, had bred the species from a chestnut. Mr. South brought a short series of *Xanthia fulvago* from Macclesfield, which were representative of a large number bred this year; var. *flavescens* occurred in about the proportion of 1 in 20, but the *flavago* form was very rare. Mr. Turner showed *Calopteryx virgo* from Horsham, and a specimen of *Lycaena icarus* from Clandon, in which the sub-marginal row of spots on the underside of the fore-wings were prolonged into dashes. Mr. Carrington exhibited some flowers of the Canadian wall-flower, which had been grown in Mr. Briggs' garden, from seeds picked at the head of Lake Superior.

The fourth Pocket Box Exhibition of the N.L.N.H.S. was held on October 10th, 1895. The meeting was fairly well attended; exhibits were numerous, and very interesting. Amongst them were the following:—Mr. Rose: *Papilio machaon*, *Hyria muricata* and *Viminia albovenosa*, from Wicken Fen. Also *Acontia luctuosa*, *Agrophila trabalis*, *Heliothis dipsacea*, *Hecatera serena* and *Acidalia rubiginata*, from Tuddenham. All these insects were taken early in July of this year. Mr. Prout: *Caradrina ambigua*, *Leucania albipuncta* and *Tryphaena subsequa*, from Sandown. Mr. Battley: *Taeniocampa miniosa*, *Asphalia ridens*, *Panolis piniperda*, *Tephrosia crepuscularia*, taken in the New Forest, at Easter; and *Scoria lineata*, *Erastria fasciana*, *Sesia culiciformis*, *Acontia luctuosa*, *Ephyra annulata*, *E. porata*, taken at Chattenenden, at Whitsuntide. Mr. L. J. Tremayne: a box of insects from North Wales, including a specimen of *Acidalia contiguaria*.

## REVIEWS AND NOTICES OF BOOKS.

ON A NEW CLASSIFICATION OF THE LEPIDOPTERA, by A. S. Packard (from the *American Naturalist*, July—September).—Upon the fact that Walter has discovered in *Eriocephala calthella*, maxillæ constructed on the type of those of mandibulate *Insecta*, and assisted by Dr. Chapman's remarkable discoveries in pupal characters throughout the Order, no less than by his special studies upon the larva of *E. calthella*, Dr. Packard proposes to divide the Lepidoptera into two "grand divisions," for which he proposes the names *Lepidoptera-Laciniata* and *Lepidoptera-Glossata*. In the course of his papers, Dr. Packard finds reason to style *Hepialus* a "colossal Tineoid." This may be the correct way of viewing *Hepialus*, but, if so, it is a "colossal Tineoid" with a jugum and without a frenulum, and thus contrasting with other "Tineoids," large and small, which are without a jugum and with a frenulum. It appears, then, unphilosophical to class the families with a jugum with those with a frenulum, as Dr. Packard would do in placing the *Hepialidae* among the *TINEIDÆ*. The jugum is undoubtedly a characteristic of the lowest Lepidoptera or Palæolepidoptera, and has evidently been retained longer, in other existing families, than the free pupa or the maxillæ of the imago. Hence, for purposes of classification, the jugum offers a character common to more families than the free pupa or the retained mandibulate maxillæ. Morpholo-

gically considered, the difference in the mouth parts of the imago seems more important. As it is shown only by a single species, so far as known, this one should weigh the rest. But we are not quite unprepared for such a discovery. The valuable researches of Dr. Chapman have settled the inferior rank of the *Pyralidae*, and *Accentropus* affords some leaning to the Trichoptera in the small and single-jointed maxillary palpi, and the reduction of the tongue to a short double filamentary process. It is perhaps worthy of note that Schrank, in 1802, restricts the genus *Tinea* to the *Pyralidae* (*Crambinae*), and, in the breaking up of the *TINEINA*, which now seems imminent, this should be borne in mind, since what we now call *Tinea* and *Tineidae* may have to be renamed.

Dr. Packard throughout pays a just tribute to Dr. Chapman's discoveries, and recognises their importance. The terms introduced by this authority are retained, and the observations underlying these terms verified as far as the material goes. [The paper on *Eriocephala*, by Dr. Chapman, was unknown to the writer in drawing up the "Systema" (August, 1895); the sequence therein of the families is, however, not affected by the fact, the *Eriocephalidae* being simply not included at the last, as they might have been.] It would seem from Dr. Packard's paper, that the term *Glossata*, of Fabricius, might come again into use. Certainly many forms of this division are in reality *Ayglossata*, just as many *Frenatae* want the frenulum. Perhaps the prior designations of Comstock might be retained, and the families with double jugum designated as *Bijugatae*. The objection to calling the *Eriocephalides*—*Laciniata*, and retaining also Comstock's terms, is that these would be no longer exclusive. These papers of Dr. Packard are illustrated by large drawings of pupæ and pupal parts, and abound in instructive structural details and comparisons. The result may be summed up in the sentence, that the phylogeny of the Lepidoptera, the connection with other orders of *Insecta*, may be demonstrated from living forms. The points in which certain *Pyralidae* and lower moths resemble the Trichoptera are now assuming phylogenetic importance. Other points for reflection are offered by Dr. Packard's paper. His quite recent list of the Bombycines, to which attention was called by Dyar, under their old limitation (1864), is at last abandoned, and we are given a genealogical tree at the close, which "combines" many of the discoveries of Dyar and Chapman. Another point is, that the tribute in Dr. Packard's papers forms a striking comment upon the observations of Mr. Hulst, observations which Mr. Dyar euphemistically sets down to an "enthusiastic Americanism." The labours of Dr. Chapman belong to all of us, but they reflect, in particular, the greatest credit upon British entomology. Mr. Hulst's remarks are not American in any true sense; they are akin to those published in the *Entomological News* of Philadelphia, by Mr. Hermann Strecker, and are probably a phenomenon which may diminish in proportion as knowledge and culture become more general.—A. RADCLIFFE GROTE, A.M.

The two concluding parts of "The Monograph of the British Pterophorina" have just been issued, 6d. per part. The complete work, bound in cloth, 161 pp., can be obtained from Mr. J. E. Robson, F.E.S., Hartlepool. Price 5s.

The SECOND EDITION of "Random Recollections of Woodland, Fen and Hill," with 104 illustrations, is now to be obtained from Messrs. George Gill & Sons, Warwick Lane, E.C. Price 2s. 6d.

# The Entomologist's Record AND JOURNAL OF VARIATION.

---

VOL. VII. No. 5.

DECEMBER 1ST, 1895.

---

## CALLIMORPHA HERA.

By J. W. TUTT, F.E.S.

Everyone, I suppose, knows the history of *Callimorpha hera* as a British insect—how, some thirty years ago, a specimen was taken at light, followed some years afterwards by a great haul, which almost every British collector believed to have had a Continental origin. Unfortunately circumstances pointed very strongly to this, and it was generally assumed that the specimens were either bred directly from foreign pupæ, or that the moth had been laid down in one of its early stages, and captured on its emergence later in the season. However, we know that circumstantial evidence is not always to be relied upon, and in this case it would appear from facts that have come to light more recently that *C. hera* has long had a haunt in the Starcross district of Devonshire.

Many well-known lepidopterists have captured the imago in its native wilds. Eggs have been obtained in plenty, and the insect has been bred in considerable numbers, and it must be a poor collection that does not contain a more or less complete series of this charming insect, whilst the entomologist who has not seen the larva must either live far from those centres where insect collectors most do congregate, or be quite out of touch with his entomological brethren.

It is not given to everyone to see *C. hera* in its restricted haunts in Britain, or to beat it out from the hedges in which, in Devonshire, it appears to love to hide. Nor is it well that those who can revel in the sunshine, and see this lovely insect lazily sucking nectar from the eupatorium flowers in its Continental haunts, should waste their time, ruin their patience, use up their energy with a beating-stick, put up with a never-ending series of unwished-for shower-baths, in order to add a ragged-winged specimen to their cabinets; for it must be owned that the captured specimens are rarely in good condition, and that were it not for the readiness with which the females lay eggs, and the comparative ease with which the larvæ are reared, we should have but few good series of British specimens in our collections. For myself, I prefer to sit under the shade of a thick walnut or ash tree, and watch the insect in dozens taking its natural morning flight, or sucking its noon-day meal from the clumps of eupatorium, Alpine thistle, or other favoured flower.

'Twas in the Cogne Valley I first saw this lovely insect, in its native haunts. In a wild gorge, thickly covered with deciduous trees, about halfway down the valley, between Cogne and Aosta, there was a flash of scarlet, appearing and disappearing rapidly, and then a sudden rush to the ground. "Can't you see it?" said my companion. I peered carefully at the spot where I thought it must be, but failed entirely to detect it, nor could I see it till Dr. Chapman pointed it out to me, seated on a flower about six inches above, but otherwise in a direct line with the point at which I had been peering so intently. Another and another lazily got up as we walked on, their scarlet hind-wings conspicuous, but as they neared the ground they became suddenly invisible, as they covered their bright hind-wings with their creamy-striped dark green fore-wings. The sudden change from scarlet to what appears on the wing as black, puzzles one until one gets used to the habit, and then it must be confessed *C. heva* is not difficult to follow.

The following day, being at Aosta, we took a morning stroll and found ourselves on a vine-covered slope. Following a rough footpath, we found that it opened out into a dry watercourse with steep sides, covered with grass and thyme, whilst along its lower edges starved plants of the Alpine thistle could hardly support their yellow-green capitula. A row of shady walnut trees ran along one side of the miniature valley, but we had scarcely stepped off the rocks and got among the herbage, before one, then another, and yet another scarlet-coated *C. heva* flew from the thistle flowers, circled for a few moments in the air, and then settled comfortably on another thistle-head to continue their feast. Two, three and four of the insects were on almost every flower, hanging motionless, and almost invisible until disturbed. Their iridescent green wings and creamy lines are wonderfully suited for their protection, and one cannot but think that Lord Walsingham's suggestion as to the value of the brightly-tinted blue and red colours to the two species of grasshoppers which are so abundant in the Alps, as warning colours when the insects are disturbed and as being of such a great contrast to the darker tints of the fore-wings when the wings are closed, finds an exact parallel in this interesting moth. Here, at any rate, *C. heva* showed us its true self; here we could study its true habits; here we could learn what its habits in Britain probably would be when the hot sun tempts it from the hedges, which usually have to be beaten to disturb it.

We found a considerable number of specimens in all sorts of condition—good, bad and indifferent; but, and this is a most important but, we observed no variation. Perhaps a trifle smaller, on the whole, than captured British specimens, the Aosta insects were, nevertheless, distinctly a stronger and more sturdy race, wonderfully richly tinted, but without the slightest tendency to yellow. Deep, rich scarlet was the colour of the hind-wings of every specimen examined in this charming spot. On the same ground *Pieris daphnice* was abundant; whilst, sharing the thistle-nectar with the Tigers, were vast numbers of Footmen (*Lithosia unita*, I believe), and the little crimson and gold *Rhodaria sanguinalis* skipped about in company with *Lycaena bellargus* and its lowly, almost tailed ally, *L. meleager*, whilst *Hipparchia statilinus* haunted the rocks in the steep bed of the dried-up stream.

The females captured were most ready to lay their eggs, and two or three boxes in which they were placed were afterwards found to contain

a considerable number. These I gave to various friends in our London societies, but none reared a single specimen, all the larvæ failing to hibernate. I have no doubt that the variation of climate was the cause, and one can readily imagine the great difference which exists between the ordinary climate of such a charming spot as Aosta and our own unreliable climate.

We found *Callimorpha hera* again. This time in a delightful hollow on the slope of the Pfänder, just above Bregenz, and facing Lake Constance. A little stream rushed down the side of the mountain, and the rocks had evidently so obstructed its course that it had worn out a great hollow, the bottom of which it had slowly filled up with sediment before it tumbled over and went on its course to the plain below. Imagine a large hollow with sloping, flower-clad banks, ringed around at the top with larch and nut, alder and oak, beech and other forest trees, whilst its lower edge formed a marshy, rush-covered flat with alders and eupatorium thickly interlacing all over it. This flat was maintained by the huge rocks at its lower edge, through which the stream at last fell precipitously into the lovely tree-covered gorge below. It was here that *C. hera* occurred again, with swarms of *Argynnis paphia*, *A. aglaia* and *A. adippe*, with *Gonepteryx rhamni*, *Grapta c-album*, *Vanessa io* and an occasional *Euvanesa antiopa*, whilst a magnificent, well-ocellated form of *Erebia aethiops*, or a snow-white *Leucophasia sinapis* occasionally fluttered over the marshy portion. Here the eupatorium flowers proved the attraction, and on the flowers the moths were absorbed in their feast in the morning sun. It was one of those rare treats in life, when one could lazily sit under a nut-bush and pick the already ripe hazel-nuts, whilst the insects played and toyed, fought and quarrelled about the nectar of the eupatorium flowers. In front the wood-clad mountain sloped so steeply that it gave a full view, over the tree-tops, of the lovely blue waters of Lake Constance beyond. Of the insects there, *C. hera* alone was quiet and peaceful, nothing disturbed its calm, unless a bustling *A. paphia* stood upon it, and then it did shake its scarlet wings, soar a few yards in the air, and settle down again. One thing could be relied upon; you could watch a specimen alight on a flower, leave the spot for an hour or so to explore some other retired nook, and make quite sure when you came back again of finding the specimen where you left it. These specimens, too, were all scarlet, none with yellow hind-wings were obtained.

The variation of the hind-wings is one of the great peculiarities of our British specimens. From the brightest scarlet, through every intermediate shade to clearest yellow, the tints run in regular gradation if sufficient specimens be obtained. Not that the yellow aberration is not obtained on the Continent, for reference to Staudinger's *Catalogue* shows that it is well-known, that it was named *lutescens* by Staudinger in his *Catalogue* of 1861, being described by him as having "the posterior wings yellow and spotted with black." He gives as its localities "north-west France, etc." I have no notion to what localities the "etc." refers, but the locality given, together with its occurrence in Devonshire, suggests it as an aberration prevalent in the more western areas of its distribution, and has done more to convince me of the genuineness of the British localities, and that Devonshire is indeed an ancient home of this beautiful species, than anything else.

I can only add that of all the Continental specimens I have seen, I have obtained none like the yellow and intermediate forms which we catch in Devon, and often breed from eggs laid by British parents.

The day-flying habits of the *Lithosiidae* and of the *Eucheliidae* are well-known. I have no doubt that this is their natural habit in the warm countries they inhabit on the Continent, and to a large extent is so here. The exigencies of our climate, however, may have modified such habit, as it is well-known to have done in the case of several Noctuid moths, which, like *Agrotis tritici*, *Hydroecia nictitans* and others, occasionally give us traces of an old habit as they fly by day from flower to flower, a habit quite normal in the high Alps, where the radiation by night is so great, that it soon produces a very low temperature, and yet whose usual habit now in Britain is to fly at dusk, and come to our sugar, "weather and other circumstances permitting."

No one need fear facing the breeding of British *Callimorpha hera*. The larvæ are almost omnivorous, and dearly love dandelion and other garden weeds. Hybernating them is the difficulty, but, hybernation over, they feed on strongly and pretty quickly to pupation. Their hybernation includes feeding just a little when suitable weather occurs, and hence they want care and attention. Given these, you can breed *C. hera*. A little bird over my shoulder whispers "or anything else."

### **Coenonympha typhon and its varieties.\***

By F. J. BUCKELL, M.B., B.S., Lond.

The sub-family *Satyrinae* furnishes not a few perplexing puzzles to the student of synonymy. Several causes conduce to this. (1) Many of its species resemble one another to such an extent, as to render it easy for an entomologist, who had no guide but the short and often imperfect descriptions of the earliest authors, to suppose that the butterfly which he was examining was one that he there found described and named, although, as it afterwards turned out, it was an entirely different species. As a consequence more than one insect was known by the same name. (2) The *Satyrids* are an especially variable lot; the sexes generally differ a good deal, and often got distinct names from the same author, as was the case with the Meadow Brown, whose male Linné called *ianira*, and its female *iurtina*. (3) Many of the earlier authors were not field-entomologists, and depended on others for the specimens which they described or figured; moreover they not infrequently founded their description or figure on a very small number of specimens—sometimes even on a single one; others, meeting with different forms, did not recognise their specific identity with the insects already described or figured and named, and so named these forms as independent species. Thus, the same species received several different names, and this multiplication of names was rendered more easy by the tendency of the varieties to form local races.

Among the British representatives of the sub-family, *Erebia epiphron* and *Coenonympha typhon* stand out as species whose synonymy is pre-eminently difficult to disentangle. In the case of the former it

[\* A Paper read before the City of London Entomological and Natural History Society, October 15th, 1895.]

almost seems as if no two authors had got hold of the same form. The latter is, however, more interesting to British entomologists, inasmuch as most if not all of its varieties occur in this country as well as on the Continent. This is not a common occurrence, at all events to anything like the same extent, among our butterflies. The varieties have been named independently, both here and there; often they have been identified with insects with which it is clear that they have nothing to do; and so, in the case of this species, we have added to the task of disentangling the Continental synonymy, the necessity of doing the same for the British and then of attempting to correlate the two.

The conclusions that will be set forth in this paper are based, on the one hand, upon a careful study of all descriptions or figures of the insect, whether British or Continental, to which any reference could be found; and on the other, upon an examination of Mr. Tutt's long series of the species, which has been gathered from very many localities, and of my own much smaller one, for which I have to thank many kind correspondents.

It will, I think, be best first to consider the butterfly as it occurs in the United Kingdom, and to try and determine whether it occurs in such distinct forms as to justify varietal names; then to deal with the names which have been given by our countrymen; and finally to try and correlate these with the Continental names.

At the outset it must be frankly admitted that in a series even of the extent of that possessed by Mr. Tutt, it becomes possible to find an infinite number of intermediate links between the two extreme forms. Nevertheless it seems to me possible to single out three forms which are sufficiently distinct to justify their receiving names, and which roughly seem to predominate respectively in the Southern, the Middle and the Northern areas of distribution of the species in the United Kingdom.

It may be helpful at this point to indicate certain characters which are not sufficiently constant to be available in the differentiation of the several forms. The colour of the upper surface is of some value in differentiating the Southern from the other two forms, but of none as between the Middle and Northern forms; the female is always lighter than the male—in the Middle and Northern forms much lighter. The continuity or interruptedness of the white band across the middle of the under surface of the hind-wings is of no value whatever; its condition varies infinitely and correspondingly in all the forms. The best distinguishing marks are to be found in the colour and ocellation of the under side of the hind-wings.

After these preliminaries, we will proceed to consider the three forms. The Southern, which is met with chiefly on the Lancashire moorlands, reaching across to the southern part of Westmoreland, is of a more or less dark brown on the upper surface, the females being only slightly paler. The ocellated spots on the upper surface are well marked, and are surrounded with a fulvous ring; three of them are almost always to be found on the hind-wing, sometimes five or six. The underside of the hind-wing is of a uniform brown tint; the transverse white band is usually well developed, and the black constituent of the ocellated spots is large, so that these form a very conspicuous part of the ornamentation of the wing.



Passing now to the Middle form, this occurs predominantly at Morpeth, in Northumberland. Mr. Tutt has it from Carlisle, and I received a large number from a generous correspondent at Penrith. In addition I have specimens from West Argyleshire, and Mr. Tutt has it from several parts of Ireland. Much to my surprise, Captain Blaydes Thompson received specimens of this form from so southern a locality as Thorne Waste, which is situated near the Lincolnshire border of Yorkshire. In the colour of the upper surface this form varies from a tint almost as dark as the Southern form to one resembling that of *C. pamphilus*. Ocellated spots are generally present on the upper surface of both wings, but are small and surrounded by an ochreous instead of a fulvous ring, and are rarely more, often less, than three in number on the hind-wings. The basal half of the under surface of the hind-wings is greenish tending to ashy, and in fresh specimens is characteristically hairy; the outer area is of a somewhat brownish shade, and there are five ocellated spots, distinctly marked but small, with pale ochreous rings.

The Northern form seems to have its headquarters about Aberdeen, at least it is from there that it generally reaches our cabinets. Mr. Tutt has it from Rannoch, and a single specimen from Killarney. The colour of the upper surface varies a good deal, but generally has something of a ferruginous tint; the female, however, is of a "pamphilus" tint. The ocellation of the upper surface of the fore-wing is always obscure, often consisting only of a tiny ochreous dot or two, and frequently ocellated spots are entirely absent. The colour of the under-side of the hind-wing is not very different from that of the Middle form; there is, however, less distinction between the basal and outer areas; as in that, the basal area is hairy; the characteristic of this form as regards the ocellation of the under surface of the hind-wings is obsolescence; frequently ocellated spots are almost imperceptible, and sometimes no trace of them can be discovered; there are never more than one or two that are at all distinct.

Shortly, these three forms may be differentiated by the condition of the ocellation of the under surface of the hind-wings, thus:—

Southern form : ocellated spots large and distinct.

Middle form : ocellated spots small and distinct.

Northern form : ocellated spots obsolescent.

It may be, although my geographical knowledge does not enable me to say whether it is the case, that the three forms also represent different ranges in altitude above sea-level.

The three forms occur in their typical perfection in the localities I have indicated, but we also find areas of admixture. Forms intermediate between the Southern and Middle forms occur, so far as my material goes, at Carlisle, Rotherham, Thorne Waste, and Goole; and between the Middle and Northern at Carlisle, Morpeth, Glasgow, and Pitcaple, as well as at Mohill, in County Leitrim.

Having thus indicated the characteristics and distribution of the three forms which seem worthy to bear names, I turn next to the names which they have borne in the writings of our countrymen. With regard to the Southern form our course is easy. This was the earliest form observed here, and appears to have been first met with rather more than a hundred years ago. Lewin, who is the first British author to notice it, says, in 1795, that it was "scarcely known

in England till lately, when a gentleman found several in a swampy situation near Manchester." By Lewin and Donovan it was supposed, to be the *P. hero* of Linnaeus, an identification which, as we shall see, could be defended from the works of that author. From the time of Haworth, however, on to that of Stainton, it was uniformly known by the trivial name of *darus*, and Mr. W. F. Kirby, both in the little *Manual of European Butterflies* (1862), and in his *Synonymic Catalogue* applies this name to it under the belief that it was the form that Fabricius described under that name. Newman adopts the varietal name *rothliebii*, by which, since his time, this form has generally been known in this country.

The other two forms have never been very clearly differentiated by British authors. Haworth describes two species under the respective names of *Pap. polydama* and *Pap. typhon*. There can, I think, be no doubt that Haworth's description (*Lep. Brit.*, vol. i., p. 16, No. 17) of *Pap. polydama* applies to what I have called the MIDDLE form. A translation of it runs as follows:—"Upper Surface—Fore-wings greyish-fulvous, with two blind ocellated spots near the outer margin. Hind-wings fuscous, but with a broad whitish inner-marginal area, and with one small blind ocellus near the anal angle. Under Surface—Fore-wings fulvous-fuscous, blackish at the base, ashy at the apex, with an abbreviated transverse whitish fascia; between this fascia and the hind-margin are two ocellated spots, distant from one another, with obsolete white pupils and a black iris surrounded with white. Hind-wings have a broad blackish fascia at the base, toothed at the outer side, and terminated by an irregular whitish fasciola; beyond this the colour is ashy; there are six small ocellated spots, of which three are almost obliterated; all the ocelli are surrounded with a white ring." Haworth further says that this insect much resembles in size the insect which he had just before described under the name of *Pap. darus*, but differs from it in being rather of a fulvous tint on the upper surface and ashy below, and in having smaller ocelli, whose cincture is white instead of fulvous. The single specimen from which Haworth made his description was sent to him by Mr. Watson, who "once took it in Yorkshire." This form continued to be known by this name to Stephens, Duncan, and Westwood, but by later authors it has been mixed up with the Northern form under the name of *darus*. Stephens mentions North Wales as a locality where it occurs. Miss Jermyn, who generally follows Haworth closely, for some unaccountable reason changed the name to *polymeda*.

The Northern form is probably that which Haworth (*l.c.*) describes under the name of *Pap. typhon*. The only doubt upon the point is due to the fact that he gives Yorkshire as its habitat, from which locality it had been sent to him, like the preceding, by Mr. Watson. Mr. Porritt, who is an authority on Yorkshire lepidoptera, writes to me: "Your Northern form I have from Scotland only; I have never seen it in Yorkshire, and should be very much astonished to do so." Haworth's description I have translated as follows: "*Male*—all wings greyish-ferruginous on the upper surface, either without ocelli or with an obsolete one on the fore-wings. Under surface—Fore-wings ferruginous with an abbreviated white fascia beyond the middle; one ocellus with a white pupil, black iris and whitish ring; apex ashy-whitish. Hind-wings, from the base almost to the middle, very hairy

and fuscous or greenish; this area is bounded by an abbreviated whitish streak or fasciola; beyond this is a grey area with two obsolete ocelli, followed by a whitish marginal fascia. The female is much paler; the upper surface is unspotted, but, in common with the under surface, often shows large pale blotches." This description accords so well with the specimens which we now-a-days receive from Aberdeen, that one is tempted to think that Haworth's information as to the locality from which his specimen came was at fault. Subsequent authors made no clear differentiation between the Middle and Northern forms. Newman's figures of *davus* are decidedly of the Northern form, but in his description he does not differentiate the two.

Stephens (*Illustr. Haust.*, vol. i., p. 64, pl. 7, fig. 1-2) describes a *Hipparchia iphis*, the exact identification of which is not easy. It was of a deep rusty tawny on the upper surface, and without spots, thus inclining to the Northern form. On the under surface of the hindwings, however, the basal area was deep greenish brown, the outer area in the male was uniform with the basal, but in the female was cloudily fulvous, and there were usually five whitish circles with black dots in most of them, and a sixth ocellus is mentioned between the costa and the white interrupted transverse band. Stephens indicates nine varieties of the ocellation, and gives as localities for the species Beverley, Cottingham, Scotland, Wales and Cumberland. In the appendix, published a few months later, Stephens states that he had then become convinced that his *H. iphis* and Haworth's *Pap. polydama* were identical, and that the chief distinction between them was that the white fascia was uninterrupted in *polydama*, interrupted in *iphis*. It is probable, therefore, that *iphis*, Steph., is strictly synonymous with *polydama*, Haworth.

We arrive, then, at the conclusions:—

(a) That the SOUTHERN FORM, at first supposed to be *Pap. hero*, Linn., was for a long time known as *davus*, and in later years as var. *rothliebii*.

(b) That the MIDDLE FORM is the *Pap. polydama* of Haworth and other authors, the *H. iphis* of Stephens, and the *H. polymeda* of Jermyn, but that in recent years it has not been differentiated from the Northern form.

(c) That the Northern form may be the *Pap. typhon* of Haworth, and has from the time of Newman generally been considered the typical *C. davus*.

We now reach the third part of our subject—the attempt to bring these British names into line with those given on the Continent. Linnaeus undoubtedly knew the insect, for he gives a recognisable description of it in the first edition of the *Fauna Suecica* (p. 240, No. 790), without, however, assigning to it any trivial name. In the second edition of this work he confuses it with the species which he there names *P. hero*, and places the diagnosis of the first edition as a second string to *P. hero*, from which, however, a comparison of the diagnoses shows it to be essentially different. This fact it undoubtedly was, that led some of the earliest authors (De Geer on the Continent, Turton, Lewin and Donovan in this country) to apply the name *hero* to it.

The earliest name which we find rightly assigned to the species is *Pap. typhon*, which was given by Rottemburg (*Der Naturforscher*, St. vi., p. 15) in 1775. Rottemburg's type is described as of a similar

coloration to *pamphilus* on both sides; it had one or two indistinct ocelli on the upper surface of the fore-wings, and from none to two on the same surface of the hind-wings. On the underside it is noted\* that the ocelli are very distinct; on the fore-wings there are from one to three, and on the hind-wings five or six. This agrees well with our Middle form, although Rottemburg evidently obtained a form much paler than the bulk of our male specimens; still, I have a specimen from West Argyleshire that agrees with Rottemburg's colour-word. Possibly the specimen from which the description was made was a female. We may then conclude that our Middle form, the *Pap. polydama* of Haworth, is the typical *Coenonympha typhon*; this trivial name, however, never obtained a very wide currency.

We next come to the familiar *davus*, which owes its origin to Fabricius (*Gen. Ins.*, p. 259), and dates from 1777. There is considerable difference of opinion as to which form it was that Fabricius had. As already stated, our own earlier authors applied his name to our Southern form; Staudinger makes it a synonym of the type. It is not easy to decide with certainty to which of these forms it rightly applies, but there can be no doubt that it is wrongly applied to the imperfectly ocellated Northern form. The colour of the upper surface is described as fulvous, the hind-wings being darker; on the upper surface there were two ocellated spots on the fore-wing, and on the hind-wing five or six. So far it might be identified as the Southern form, inasmuch as I have seen no specimen of the type with six ocellated spots on the upper surface of the hind-wing. Fulvous, however, is hardly the colour-word which would describe this form as we see it, and the description of the underside of the hind-wings as grey applies more aptly to our Middle than to our Southern form. Herbst's *davus* (as also Ochsenheimer's and Godart's) are undoubtedly the type to which, on the Continent, the name seems to have been pretty generally applied.

The next name we must consider is Esper's *philoxenus*. In his first use of this name (*Die Schmett. in Abbild.*, Th. i., Bd. 2, p. 25, pl. 54, fig. 3) he undoubtedly applies it to the type, as is shown by the colour-word yellow, which could never be applied to our Southern form, and by the figure. Two years later, however, under the same name, he describes and figures (*ib.*, p. 182, pl. 78, fig. 3) what he supposes to be the male of the same species, but what is undoubtedly our Southern form. That the two figures bear the interpretation I have here put upon them is clear from the fact that in the earlier one there are, on the underside of the hind-wings, six distinct but small ocellated spots with ochreous rings; in the later, six large ones with yellow rings. I submit, therefore, that Esper mixed two forms together under this name; that the earlier form is the already-named type, but that the name *philoxenus* is undoubtedly the earliest given to the dark Southern form,\* and may be legitimately adopted as the varietal name of that form, as is done by Staudinger and those who follow him. The name that is more usually applied to this form in this country is *rothliebii*, which is generally supposed to have first seen the light in the first edition of Staudinger's *Catalogue* (1861), but which was used by Herrich-Schäffer ten years earlier, and by him attributed to Gerhard. I have not been able to discover where (if anywhere) Gerhard published the

\* Unless *davus*, Fab., be admitted to have been applied to this form.

name; and it may be, as suggested to me by Mr. Kirby, that so far as he is concerned, it was only a manuscript name.

\* We have thus far traced out the earliest name of our Southern and Middle forms. We next reach the earliest name of our Northern form, *laidion*, under which name it is described by Borkhausen (*Naturgeschichte*, vol. i., p. 91, No. 29) in 1788. Borkhausen's colour-word is yellow ochre, and the upper surface is without spots or markings. On the underside the fore-wings are grey at the tip and have a single eye; the hind-wings are grey with two obscure little eyes. Diehl, writing in Borkhausen's *Rheinisches Magazin* five years later, says that it was a female that Borkhausen described (which would account for the colour-word), and that the male is somewhat smaller and darker. Lang (*Rhop. Europ.*) accepts this as the right name for the obsoletely ocellated Northern form, and there can be little doubt that this is the name by which that form should be known.

Continental authors have established the form found in the extreme north of Europe and Asia as a distinct variety under the name of *isis*, and this is generally spoken of as smaller and paler than the type, and as almost or entirely destitute of ocellated spots. I do not think difference of size is sufficient to establish this as a distinct form from *laidion*, with which none of the earlier authors who deal with it compare it. Lang, in his *Rhopalocera Europae*, says: "Judging from the specimens sent to me by Dr. Staudinger, it very closely resembles the British var. *laidion*;" Aurivillius, in his *Nordens Fjärilar*, concerning which my great regret is that my Swedish is not sufficiently good to read it with certainty, makes the two names *laidion* and *isis* synonymous, and this was the conclusion at which I had arrived before I was aware of the position taken by Aurivillius.\*

As regards size, our Scotch specimens differ a good deal among themselves, and it is probably a not unscientific conclusion that insects inhabiting the ungenial regions of the north would be smaller than their relatives farther south.

As regards colour, Thunberg, who is usually credited with the first description of *isis* (although I cannot feel satisfied that the article in which it occurs is not really by Becklin), uses the colour-word ferruginous, or ferruginous-fuscous. Zetterstedt, who is the next to notice the insect, calls the colour dilute yellow ochre, and says that it differs from *damus* chiefly in the paler colour of the upper surface of the fore-wings. Herrich-Schäffer, who had specimens from Kretschman, says the colour is somewhat duller than that of *damus*. Freyer, under the name of *demophile*, figures the same insect as of a dull ochreous colour in the male, with a darker shade on the outer margin. Ménétrés, who dealt with the Russian and Siberian forms, distinguishes three forms of var. *isis*, but does not speak of any of them as paler than the type, and Aurivillius distinctly says that *isis* is darker than the type. It seems to me, therefore, that there is not sufficient evidence of the existence of a pale Lapp race to justify the establishment of a separate variety, although it is highly probable that variations in tint are met with just as is the case with our own Northern form. If this be so, then *isis* must sink as a varietal name.

In 1861 the great American lepidopterist, W. H. Edwards, described (*Proc. Acad. Nat. Sci. Philadelphia*, p. 163), a butterfly from

\* Reuter, in the work recently reviewed in these pages, agrees with Aurivillius.

Lake Winnipeg, to which, believing it to be a new species, he gave the name *Coenonympha inornata*. Scudder (*Butterflies of Eastern United States*) also treats it as a distinct species. The late Jenner Weir, however, in an article on the Rhopalocera of Hudson's Bay (*Entom.*, vol. xvii., p. 50), treats it as a var. of *C. typhon*. At present I am not prepared to express an opinion as to which view is the correct one. To do so would require a careful comparison of American specimens with European ones, and this I have had no means of making. I should, however, expect that Mr. Weir, who was able to make the comparison, and whose acumen is known to all, was right, and his view certainly receives support from Edwards' description. In this the male is said to be ochrey-brown on the upper side, the disc somewhat lighter, and the costal margin of the fore-wings and inner margin of hind-wings greyish; there are no spots above or below. On the underside the outer area of the fore-wings is grey, the hind-wings are grey with a slightly greenish tinge, and darker from base to middle. The female is wholly dull ochrey-yellow. Mr. Weir says (*l.c.*) of the variety, as he considers it:—"They are like the British *C. darus*, but even less marked with ocellated spots; indeed on the upper side of the wings of two specimens I cannot discover any markings." Provisionally I am disposed to think that the form is not worthy of differentiation from var. *laidion*.

To sum up, the conclusions which have been reached in this paper may be tabulated as follows:—

Type, *C. typhon*, Rott. = ? *darus*, Fb.; ? *iphis*, Diehl; *polydama*, Haw.; *polymeda*, Germ.; ? *iphis*, Steph.; *tullia*, Hb.—British Middle Form.

Var. *philoxenus*, Esp. = ? *musarion*, Bork.; *hero*, Lewin; *darus*, Haw., Germ., Steph., Westwood, Staint.; *rothliebii*, Herr.-Schäffer, Newm.—British Southern Form.

Var. *laidion*, Bork. = ? *isis*, Thnbg., Zett., Ménét.; *demophile*, Frr.; ? *typhon*, Haw., Westwood; ? *inornata*, Edw.—British Northern Form.

## An Instrument to be used as an aid for Setting the Smaller Species of Lepidoptera.

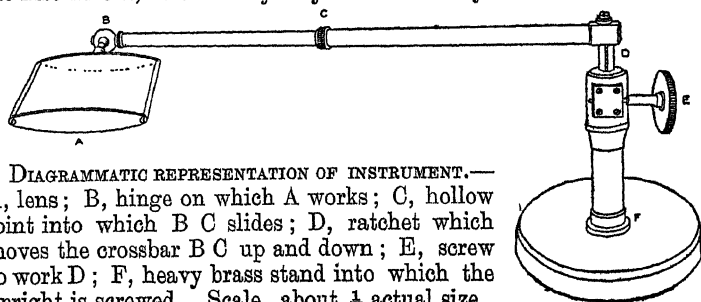
By J. A. CLARK, F.E.S.

One often hears lepidopterists explain that they do not collect the smaller species of Lepidoptera because of the difficulty of setting them, and the older collectors often hint that their eyesight is not sufficiently good to set them with advantage even if they did collect them.

Now that the march of science is necessarily sweeping away the old landmarks, and that the old terms MACRO-LEPIDOPTERA and MICRO-LEPIDOPTERA are practically (and I may add really) meaningless, and have to give way to OBTECTÆ and INCOMPLETÆ, representing respectively the more highly and less highly evolved of the Lepidoptera, some large and some small species being included in each group, it will become more necessary than ever that observant and intelligent entomologists should study simultaneously those species which show close alliance one with the other, whether they be large or small in size.

I have for many years collected the smaller species of Lepidoptera, but have recently found the necessity of obtaining some aid to my

natural powers of sight, to properly set the smaller species. After considerable trouble and expense I have devised and had constructed an instrument which has proved invaluable, and the knowledge that many brother entomologists may be glad to have the benefit of my invention and experience, leads me to offer a figure and description of the instrument, so that they may benefit thereby.



DIAGRAMMATIC REPRESENTATION OF INSTRUMENT.—

A, lens; B, hinge on which A works; C, hollow joint into which B C slides; D, ratchet which moves the crossbar B C up and down; E, screw to work D; F, heavy brass stand into which the upright is screwed. Scale, about  $\frac{1}{2}$  actual size.

It consists of a brass stand F, heavy enough to prevent any possibility of tilting, into the centre of which the brass upright D F is screwed. D is a ratchet working up and down so that the lens A may be raised or lowered. E is the screw by which the ratchet is elevated or depressed. The cross-bar is made of two hollow brass rods, the right-hand portion attached to the upright D F, the left-hand portion attached to the lens A. A slit in the left-hand part allows it to slip readily, under slight pressure, into C, and to remain firmly fixed there. The lens A works on a hinge at B, and is free to move in any direction. The focus of the lens may be adjusted by raising or depressing the lens by means of the screw E.

To use the instrument for setting insects, place the setting board under the lens A, look through the lens at the insect you are about to set, focus by means of E, and then go to work in the ordinary manner. The magnifying power may be varied by the use of lenses of different powers; the one represented in the diagram enlarges objects from two to three times their natural size. The height of the top cross-bar is amply sufficient to allow the right hand to work beneath it.

As the proof of the pudding is in the eating, I can only add that the instrument has been of the greatest service to me. Small insects may be set with the greatest readiness and facility, and there can be no doubt that those whose eyes are not so young as they used to be have one excuse less, when they attempt to justify themselves for not studying the smaller species, as the ease and readiness with which the instrument can be focussed for varying sights is such that it may readily be taken advantage of by all.

I need scarcely point out the utility of the instrument for other purposes besides the above. That of dissection and similar operations will immediately occur to every one.

The instrument is made in three parts, viz.: (1) The base F. (2) The upright and cross-arm to C. (3) The lens and cross-arm from B to C. These fit readily into a small mahogany case, externally not unlike a microscope case. I need not say that I shall be pleased to give any further information on the subject to anyone desiring it.—The Broadway, London Fields. November 8rd, 1895.

## SCIENTIFIC NOTES AND OBSERVATIONS.

ON THE DOUBLE-BROODEDNESS OF *CIDARIA SILACEATA* AND *EPHYRA OMICRONARIA* (ANNULATA).—*Cidaria silaceata* invariably has two broods in Devonshire; the first appears early in May, the second early in August. In the warm summer of 1893 there were three broods, at least a few individuals of a third brood emerged at the end of August, the rest going over (I recorded this unusual event in the *Record* for that year). The specimens of the early brood are a little larger, and have the dark band divided, or partly divided, by the longitudinal lines—an entire band being the exception; the specimens of the autumn brood, on the other hand, generally have the band entire, and it is the exception to meet with longitudinal lines. *Ephyra omicronaria* is also double-brooded with us, generally occurring a week or so later than *C. silaceata*. It has not been so abundant as usual this year; but the males (of the second brood) both of it and of *C. silaceata* have been attracted by light, which has been infrequently the case hitherto. Have other entomologists noticed the difficulty in procuring eggs this season? I have failed to get any fertile ones from both the above-named species as well as others.—W. S. RIDING, M.D., F.E.S., Buckerell Lodge, near Honiton. *Sept. 5th*, 1895.

EUPITHECIA SUCCENTURIATA AND SUBFULVATA.—Dr. Freer's note on these species (*ante*, p. 48) has interested me greatly, as I have recently been giving some attention to them, and think there is still room for some thoroughgoing investigation into the question of their specific distinctness, such as I have previously undertaken as regards *Coremia ferrugata* and *C. unidentaria*. I shall be very glad if this note is the means of eliciting opinions based on careful observation. For my own part, I have a perfectly open mind on the subject, and in fact have not even got so far as to form a definite opinion one way or the other. Herr Otto Bohatsch, writing in Staudinger's *Iris* for 1893 (vol. vi., p. 30), decides to re-unite them—as had been already done by Treitschke, Herrich-Schaeffer, Guenée and Snellen—having received from Dr. Staudinger, from Asia Minor, the intermediate form *disparata*, Hb., and he adds that “the larvæ, in spite of different food-plants, are identical.” I may remark here that Snellen once took the two typical forms *in cop*. As for the different food-plants, which are given by German authors as mugwort for *E. succenturiata* and yarrow for *E. subfulvata*, neither species is exclusive in its diet. I communicated to Herr Bohatsch my own experience at Sandown in 1893: a ♀ of *E. succenturiata* laid me one egg, and as I was anxious to make acquaintance with the larva, I took the trouble to rear it; rather curiously, the very first bit of mugwort which I gathered for it, when it was about to hatch, had on it four *Eupithecia* eggs, which I also kept, assuming them to be of the same species; these I took care not to mix with the other. Later on I beat another *E. succenturiata* larva out of the same food-plant. During the whole larval period no particular difference between them struck me; but I unfortunately made no comparisons, having made up my mind that I had only the one species. The result, however, proved that the four eggs found were those of *E. subfulvata*, and since my attention has been called to the fact, I find that I nearly always beat the imago



of that species out of the *Artemisia*; I fancy I have heard that some of our northern collectors also get it from the same food-plant; is that not so? Dr. Freer's note now supplies the further information that both species (or forms) will feed in a state of nature on tansy. Should any London entomologists want to rear them in their own gardens, they will find that they thrive well on chrysanthemum. I have frequently tried, during the last few years, to get eggs from *E. subfulvata* by confining it in a chip-box with sprigs of ragwort, yarrow, etc.; but having failed, I decided this year to try giving it a little more space. Having captured a tolerably fresh ♀ (on Aug. 9th), I placed her in a glass jam jar, covered over with muslin, and gave her a piece of ragwort with a good head of flowers (which I "sugared"—having several times noticed that this insect has a fancy for ragwort flowers), and also a piece of mugwort. The result was that over 200 eggs were laid, all on the latter plant, and though a good many of the latest did not hatch, I reared a good batch of the larvæ. I also collected on September 11th, by night searching, about twenty larvæ on mugwort, which were without doubt those of *E. succenturiata*. The colour was decidedly darker and duller than any of the *E. subfulvata*, but there was very little other difference; though the dorsal pattern appeared, as noticed by Crewe, to be *slightly* different in shape. Both species were fed with mugwort until I returned to London on September 21st, and then with chrysanthemum; so there is no possibility of assuming the differences to be due to food-plant; but the *E. subfulvata* were very constant in colour, and it must not be forgotten that they were all from one batch of eggs, and that heredity may probably have had considerable influence.

One or two further points which occur to me as indicating that the two insects in question must be very specialised forms, if not perfectly good species are, (1) the absence of *E. succenturiata* in some districts where *E. subfulvata* is common enough; and, (2) the fact that in districts where both occur together, and even in the self-same hedges (as at Sandown), *E. succenturiata* appears a fortnight or so earlier in the season.—LOUIS B. PROUT, F.E.S., 12, Greenwood Road, Dalston, N.E. Oct. 21st, 1895.

THE HYBERNATING STAGE OF PYRAMEIS CARDUI.—It is often stated that *Pyrameis cardui* hibernates in Britain in the imago state; but there is not, I believe, a single scintilla of direct evidence to support the assertion. Newman states (*Brit. Butts.*, p. 65): "The butterfly appears in August, but the sexes appear to take little notice of each other, and may be seen frequenting gardens or settling in roads, or on the blossoms and teasles by the roadside until the end of October, when they retire to their winter-quarters again, to appear in April, May and June; copulation then takes place, and oviposition follows during eight or ten succeeding days." The butterflies do copulate in August, for I have seen them, and I have also had the progeny of August specimens emerging in October and November, in a warm room. It is well known that *P. cardui* is a periodic insect in Britain. On one occasion at least (1879), its course from North Africa and the Mediterranean shores of Europe, to the central and northern parts of Europe was well worked out. In N. Africa there is practically no such thing as hybernation; the larvæ feed on slowly, pupate, and emerge in February and March. This is exactly what they appear to do in

England, for Mr. Buckler (*Larvæ of Brit. Butts.*, i., p. 175) states that: "On August 17th, 1885, Mr. Fletcher wrote that he had lately seen two pairs of this butterfly *in cop.*, so that no doubt there has been a second brood or partial brood this year." With this I quite agree, for I believe that all specimens (even of ordinarily hibernating species) of butterflies that pair in the autumn lay eggs, and so attempt to produce another brood, and then die.

In the same work (p. 50), Mr. Buckler says that he received larvæ on September 18th (evidently from August parents). These fed up and pupated about the middle of October, and then "early in the first week of February, 1869, *Cynthia cardui* came forth." Mr. Buckler suggests that the appearance was probably premature owing to the pupa having been kept in a warm room." No doubt the conditions of the environment brought about this result; but it is clear that in nature these larvæ would have fed more slowly than in a warm room, and that the pupa would have matured more slowly. It is therefore evident that *P. cardui* tries to pass the winter in Britain in the larval and pupal stages, and its failure to do so is an explanation of our never getting specimens except in those autumns following a spring migration of the species. Mr. Buckler's warm room allowed the species to do what I suppose it does every year naturally in northern Africa.—J. W. TUTT.

ON THE RAPIDITY WITH WHICH SOME PARASITIC INSECTS PERFORM THEIR METAMORPHOSES.—The remark (*ante*, p. 67) made by Mr. Enock as to the rapidity with which egg parasites go through their metamorphoses, and as to their multiple-broodedness, reminds me of a note which that excellent observer, Mr. J. J. Wolfe, of Skibbereen, wrote me on May 18th, 1893, about the parasite of the larvæ of *Melitæa aurinia*, which suggests that that also is multiple-brooded. He writes: "I have often met with the parasites of *M. aurinia*, referred to in this month's *Record* (vol. iv., p. 156). The egg is, I believe, deposited singly in the young larvæ shortly after hatching. After the larva stops feeding for the winter the parasite forms its cocoon inside the web. Possibly there are three broods of it. I have seen it (or another) sting full-sized larvæ, which then remained for two or three weeks without turning till the parasites emerge, when they spin in a cluster and emerge quickly (at least in captivity), perhaps to sting very young larvæ again." If parasites go through their metamorphoses at this rate, there can be no doubt that we have much underrated their destructive powers.—J. W. TUTT.

## VARIATION.

VARIATION OF *HEPIALUS HUMULI* AND *EMMELESIA ALBULATA* IN SHETLAND.—The varieties of *H. humuli* captured in Shetland this year were very fine, ranging through (1) unicolorous creamy-white, (2) creamy-white with brown spots, (3) creamy-white with grey spots, (4) creamy-white with pink spots. Males also occurred of the same yellow colour as the females, but with dark markings.—*Emmelesia albulata* ranged from the ordinary type to leaden-grey, almost without markings.—J. J. F. X. KING, F.E.S., 207, Sauchiehall Street, Glasgow. October 10th, 1895.

STRANGE ABERRATION OF *CHRYSOPHANUS PHLOEAS*.—Last Sunday I took a very curious aberration of *C. phloeas*. The upperside is normal, except that the hind marginal band on the left hind-wing is slightly paler than usual. But on the underside of the same wing there is a large patch coloured like the upper wing, *i.e.*, with black spots upon a tawny ground. Is this abnormal colouring a case of atavism?—H. H. CORBETT, M.R.C.S., 19, Hallgate, Doncaster. *September 6th, 1895.*

## NOTES ON COLLECTING, Etc.

*SPHINX CONVULVULI* AND *ACHERONTIA ATROPOS* IN SOMERSET.—One *S. convulvuli* flew into a labourer's cottage, and was brought to me on September 3rd. Mr. T. Parmiter, of Yeovil, also captured two specimens flying over tobacco plants. Mr. F. Milton writes to a local paper that two larvæ of *A. atropos* were taken at Wellington on August 18th.—W. MACMILLAN, Castle Carey, Somerset. *October 20th, 1895.*

*SPHINX CONVULVULI* AND *ACHERONTIA ATROPOS* IN STAFFORDSHIRE.—I have had one *S. convulvuli* brought to me this year, but in absolutely unsettable condition; also two larvæ of *A. atropos*, one of which died from the severe handling it received from its curious captors.—R. FREER, M.B.

*ELACHISTA ARGENTELLA* IN THE CITY.—On May 25th I captured a freshly emerged *Elachista argentella* (♀) on the wing near the Guildhall Yard corner of Basinghall Street. One sweep of my chimney-pot hat and she was my prisoner.—F. G. WHITTLE. *October 20th, 1895.*

*LITHOMIA SOLIDAGINIS* AND *STILBIA ANOMALA* AT CANNOCK CHASE.—I am afraid *L. solidaginis* has been completely wiped out of Cannock Chase by a fire, which spread all over its locality—one only was taken this year. *S. anomala* has also suffered from the same cause; but as 23 were taken this year by myself and a friend (males only, one female turned loose), and the grassy rides where the larvæ feed were not burned, I hope it may recover itself.—RICHD. FREER, M.B., Rugeley. *October, 1895.*

### Notes of the Season.

PORTLAND.—My experience of the season at Portland is that it has been a very poor one. *Agrotis pyrophila* was very scarce—I have only taken three. *A. lunigera* I have hardly seen, and *A. lucerneæ* has been less common than usual. *Heliophobus hispidus* has been scarce this autumn, and I have not seen a specimen of *Epunda licheneæ*. All these are usually to be obtained regularly, except *A. pyrophila*, which is rarely met with in any numbers. I have certainly been less to Portland this year than usual, but it is unlikely that my want of success was always owing to bad nights, though I still find it impossible to say what are the tastes of moths with regard to the weather.—N. M. RICHARDSON, B.A., F.E.S., Weymouth. *Oct. 9th, 1895.*

SCOTLAND AND NORTH OF ENGLAND.—I have not taken *Agrotis obscura* myself this season, but I understand that it has been taken in fair numbers in the Hull district. *A. pyrophila* has been taken again as usual about Pitcaple, whilst *Hepialus humuli* was abundant at Unst, and in fine variety. *Crymodes exilis* was very scarce, and I have not heard of any having been taken at Rannoch or Hoy. *Noctua depuncta* occurred freely at Forres in the autumn. Common Noctuids

have been plentiful at sugar (especially in August), in many places in the north of England and Scotland. One night at Scarborough, I should think there were 400 or 500 on the sugar, but nearly all were *Noctua xanthographa*, *Tryphaena pronuba*, and *Xylophasia polyodon*. Larvæ at the end of August were fairly abundant at Seamer Moor, and other places near that locality. The results of the little collecting I have done here during the year have been exceedingly poor.—T. MADDISON, South Bailey, Durham. Oct. 12th, 1895.

LEIGH AND SOUTHELD.—I went to Leigh on May 31st to get *Epichnopteryx reticella*, and a few larvæ of *Phygadeuon* on the cock's foot grass. Of the latter I only got one. A good many were observed last year, but only one moth was bred. *Hadena dissimilis* (*suasa*) must have occurred in great numbers on the marshes; the numerous egg-clusters were unmistakable evidence of this. The larvæ obtained fed up very quickly, and two moths appeared in August. I think it is usual for one or two individuals of a brood to appear in August, the rest lying over until the following June. The larvæ of *Hyponomeuta padellus* almost stripped our hedges this season. Towards the end of June, when on the look-out for larvæ of *Clisiocampa castrensis*, I took half-a-dozen *Phorodesma smaragdaria*—the first time I have taken the moth at large. In July I took, at Canvey and Pitsea, a few *Catoptria citrana*, *Crambus selasellus* and *Chilo phragmitellus* (one only); at Southend, at sugar, a few nice *Cerostoma vittella* and *Ceratophora rufescens*, I also found one or two *Poecilia albiceps* on fences. In August, *Catoptria candidulana* was plentiful among its food-plant on the river wall, and *Agrotis vestigialis* occurred near Shoebury. On one occasion I found a specimen of *Tortrix viridana* on a salt-marsh near Shoeburyness. Mr. Button, who made so many extraordinary captures on our Essex mud flats, has reported *T. viridana* as common at sugar on an Essex marsh (*vide. Entom.*, vol. iv., p. 115).—F. G. WHITTLE, 8, Marine Avenue, Southend. Oct. 21st, 1895.

TUNBRIDGE WELLS.—I have not had a good season. Sugar has been a failure, so far as good insects are concerned. I took several *Cymatophora fluctuosa* at lamps here. *Anchocelis lunosa* has been swarming at sugar this summer.—R. A. DALLAS BEECHING, F.E.S., 24, St. James' Road, Tunbridge Wells. October 8th, 1895.

CLAPTON.—I have bred a remarkably fine series of *Apanaea ophiogramma* from Clapton larvae. *Anchocelis lunosa* was very abundant last month in the garden, and *Xanthia gilvago* fairly common.—F. J. HANBURY, F.L.S., Stainforth House, Upper Clapton. Oct. 9th, 1895.

GLASGOW.—I have been after *Phibalapteryx lapidata* again this season, but have found it very scarce.—J. J. F. X. KING, F.E.S., Glasgow.

## NOTES ON LARVÆ, &c.

FOOD-PLANT OF *HYPENODES ALBISTRIGALIS*—A QUERY.—Can anyone tell me if the food-plant of *Hypenodes albistrigalis* is known on the Continent?—W. S. RIDING, M.D. Sept. 5th, 1895.

ON THE MANAGEMENT OF LARVÆ DURING HYBERNATION.—I would suggest, in reply to Mrs. Twopenny's question, a large roomy flower-pot with a plant or two of chickweed growing in it, and about four

or five inches of dead leaves, for the larvæ of *Arctia villica* to winter in; the pot to be put into an outside shed, and not directly exposed to rain or cold.—J. W. TUTT.

LARVÆ OF *ACHERONTIA ATROPOS*.—I have secured six larvæ this year, against ten last year.—(REV.) C. R. N. BURROWS, Rainham, Essex. Sept. 23rd, 1895.

THE EARLY STAGES OF THE SATYRINÆ.—INFORMATION WANTED.—We know none too much about the affinities of our higher Satyrids, except that *Melanargia (galatea)*, *Hipparchia (semele)*, and *Erebia* are the most specialised, not only in the British, but also in the European fauna. The highly specialised character of the pupæ of *galatea* and *semele*, and their general appearance, make one feel at once that they are very near to one another; but it is doubtful whether they have not reached a high state of development by separate though closely parallel paths. I find that I wrote some general notes, as far back as May 30th, 1893, which read as follows:

(1) The larva of *galatea* has a head which is large compared with the constricted 1st thoracic segment; it (the head) is also rather thickly clothed with hair, and in these respects much more closely resembles *ianira* than *semele*; the pinkish anal tips and crenate subspiracular ridge, due to the depth of the abdominal incisions, resemble *ianira* rather closely.

(2) The pale-brownish variety of the larva of *galatea*, although bearing a close superficial resemblance to that of *semele*, rolls in a ring when disturbed. On the other hand, that of *semele* has a tendency to keep out straight and stiff without movement under similar conditions; and not to roll up. The larva of *semele* is of a more cylindrical shape, and has the ventral surface more rounded than than that of *galatea*, which has the ventral surface flatter, and puts one somewhat in mind of a *Thecla*.

(3) The subsegments of *ianira*, *galatea* and *semele* are as follows:  
*ianira*: 3 or 4 (1st thoracic), 4 (2nd and 3rd thoracic), 5 (abdominal)  
*galatea*: 3 ( " ), 4 ( " ), 5 ( " )  
*semele*: 2 ( " ), 6 ( " ), 6 ( " )  
 thus showing a much nearer alliance between *ianira* and *galaten*, than between *galatea* and *semele*.

I am in want of information from books or observation as to the number of subsegments in the various segments of the larvæ of *Coenonympha (pamphilus or typhon)* and of *hyperanthus*. If I could get this I might be able to get sufficient evidence to prove or disprove a view I have, as to the evolution of *galatea* and *semele* as parallel Satyrid branches, rather than along the same line.—I should be also glad of the same facts with regard to *Epinephele titlonus*.—J. W. TUTT, Westcombe Hill, S.E.

## CURRENT NOTES.

Most parasites of lepidopterous larvæ live inside the body of their host. The Rev. T. A. Marshall gives an account (*E. M. M.*, Nov.) of one that attaches itself to the outside of its host, and that he believes to belong to the genus *Pteromalus*. A Noctuid larva (probably of *Mamestra brassicae*) was obtained on August 17th, which was not quite full-grown, and which was "infested with thirteen parasites,

adhering to various parts of its body, four in a row on each side above, and five on the underside in groups of two and three. The caterpillar was in an advanced state of marasmus, the anterior half of its body being much emaciated; it still clung to leaves, but was unable to eat or crawl. . . . The parasites were  $1\frac{1}{2}$  mm. in length, grass-green, smooth, shining, pyriform, and obtuse behind; their cephalic extremity (for it can hardly be called a head) was plunged into the body of the victim, the posterior and blunter end remaining free." The larva died on August 18th, and by the morning of the 21st all the parasites had released themselves from its body. On the 22nd they changed to delicate white pupæ, "lying on their backs, unprotected by any cocoons, and now showing the whole Hymenopterous structure of antennæ, legs, etc., packed into the smallest compass." In the course of a few hours the colour changed to grey, and then to deep black. The imagines emerged on September 11th and 12th.

The sale of Mr. W. Farren's *Psychidæ* and *Tineina* is announced by Mr. J. C. Stevens for December 2nd. The beautiful condition and perfect setting of the smaller species is sure to prove a great attraction, and to provoke considerable competition. On December 10th, the collection formed by the late Mr. W. H. Tugwell will be sold. During his last illness we understand that Mr. Tugwell labelled every insect in his collection. The collection contains long series of many rare and local species.

Mr. G. C. Champion (*E. M. M.*) adds *Bembidium virens*, Gyll., to the British list, having taken specimens in 1892 on the shores of Loch Maree, in Ross-shire.

*The Entomologist's Monthly Magazine* for November is rich in records of captures of rarities. Mr. R. W. Lloyd captured two specimens of *Amara alpina* on the summit of Grayvel, near Loch Rannock. Mr. H. J. Cuthbert obtained one *Carabus cancellatus* near Rosscarbery, in West Cork. Mr. J. J. Walker was successful on three occasions during the year in obtaining *Psammobius porcicollis* in fair numbers at Whitsand Bay, Cornwall. He says that the species "appears to be restricted to a space of a few square yards in extent, about half-way up the cliffs, and 30 or 40 feet above high water mark, where the clean sand of the beach passes into a sort of loam . . . . It is usually found in a burrow about an inch long, either at the side or just under the edge of the stones, and is frequently so coated with red earth as not to be at once discernible when the stone is raised." Mr. Walker thinks that it is obtainable during the whole of the spring and summer, as he found it on March 25th, and again in August. Of Lepidoptera the Rev. E. N. Bloomfield mentions the capture of a rather worn specimen of *Catocala fraxini* in a house on the outskirts of Hastings, on September 25th. Mr. Sydney Webb noticed among the Natural History Collections made by the pupils of Mr. Murray, of Upper Walmer, a fine female *Grapta c-album*, caught in the grounds of the school, at the end of September.

Mr. F. Lovell Keays calls attention (*E. M. M.*, November) to the emission of a filthy smell by a specimen (♀) of *Bapta bimaculata* (*Corycia taminata*), which reminded him of "an unusually 'strong' *Chrysopa* in full blast. The chip box smelt for hours afterwards, whilst the stench in the damp box in which it was temporarily placed made the box intolerable until thoroughly aired."

Mr. J. T. Fountain recommends (*Entom.*, November) slaked lime

for the removal of "grease." He powders it up finely, puts it in a box, and rests the wings of the "greasy" subjects on it. He covers the bodies, having first cut off a portion of the underside and extracted as much of the contents as possible. We shall be glad to hear from any of our readers who may try the experiment.

Mr. W. J. H. Simmons records (*Entom.*, November) the capture of a male *Catocala fraxini* near Folkestone.

Mr. W. T. Sturt states (*Entom.*, Nov.) that he has received from a non-entomological friend four larvæ of *Sphinx convolvuli*, which had been found by a fisherman feeding on *Convolvulus arvensis*, at Whitsand Bay, Cornwall. One had pupated at the date of his communication (Oct. 21st), the others were still feeding.

## REVIEWS AND NOTICES OF BOOKS.

DORSET LEPIDOPTERA IN 1892-8, WITH DESCRIPTION OF THE LARVA OF EPISCHNIA BANKESIELLA, by N. M. Richardson, B.A., F.E.S. [Dorchester: "Dorset County Chronicle" Printing Works.]—This little pamphlet of a dozen pages is written in a most interesting style, and is full of important matter; it is illustrated by a chromo-lithograph plate of *Lita suaedella*, *Lita ocellatella* and *Lita plantaginella*, depicting the imagines, larvæ and food-plants. The plate reflects the greatest credit on the artist, Mrs. Richardson. Mr. Richardson discusses the abundance of *Colias edusa* in 1893, of *Pyrameis cardui* in 1892, and of *Chrysophanus phloeas* in 1893, also the early appearance of *Thymelicus actaeon* in 1893, as well as the occurrence of many rarities in the same year. The three species of *Lita* from Chesil Bank, referred to above, are described in full, whilst the life-history of *Epischnia bankesiella* is a good piece of work, representing as it does the discovery of something new to science, and the clearing-up of the facts connected with the life-history of one of our most obscure and least-known species. Without mentioning the food-plant, Mr. Richardson describes the "oval, flattened, beautifully iridescent" eggs, "covered with very minute holes and small wavy ridges, enclosing numerous little spaces with from three to six sides each." The larva "from its earliest days spins a sort of nest round itself on a shoot of its food-plant and after a time, when this nest attains some size, lives in a silken tube in the middle of it, coming out at night to feed upon the leaves. In the autumn it thickens the middle portion of this tube, and there passes the winter. In the spring it seeks fresh food, and constructs another nest. About May it closes up the ends of its silk tube, forming a rather strong cocoon, turns to a pupa, and emerges in June or July." In 1893 there was a partial second brood of the moth, but this is probably quite unusual. A full description of the larva and pupa is added, with notes on the variation of the imago, some specimens being very pale, almost cream-coloured, with dark grey markings on the veins and elsewhere, whilst one specimen of the ordinary cinereous grey form has very distinct and dark transverse lines. The similarity of the moth to an accidental slight excrescence on a piece of stick or on a dead stem is very striking.

FRAIL CHILDREN OF THE AIR, by Samuel H. Scudder [Houghton, Mifflin & Co., The Riverside Press, Cambridge, Mass., U.S.A. Price 6s.]. —We read these delightful essays some years ago. We have read them

again with a delight equal to that we enjoyed at our first acquaintance. The 31 chapters are culled from the author's great work, *Butterflies of the Eastern United States and Canada*, and deal with the more philosophical questions that arise in the mind of every thoughtful entomological student. They have been revised, and are now quite up to date, and include extensions in the direction of some of the more recent discoveries such as those with regard to the coloration of certain larvæ and pupæ, by means of which they assimilate to their environment, and other additions of equally recent date. To quote from it would be to steal the book, for where should we leave off once the quoting commenced? In view, however, of the papers on hybernation, recently published in this magazine, we would give the following extract from the chapter, "Lethargy in caterpillars." The author writes :—"There are lethargic periods in the life of every caterpillar, when it has gorged itself to the full, and rests quietly to digest its meal; but these last at most but a few hours. For those that feed exclusively by day, or by night, as the case may be, there is also that slightly longer diurnal period when they enjoy a period of quiet, shared with a great body of their fellow creatures, including ourselves. There is further that much longer period of inactivity which comes to those that must pass the winter in the caterpillar stage, a period we call hybernation, and which is immediately related to low temperature and absence of food. The period of inactivity, termed lethargy, is directly connected with this last, although neither of the provocative causes are present. It is a period of greater or less duration, lasting from a few days to a few months, generally as much as two or three weeks, often in the very heat of midsummer, when the food-plant of the caterpillar is superabundant and low temperatures are at farthest remove. In some instances it extends from midsummer to winter, and so may be called premature hybernation. In nearly, if not quite, all cases it affects only a portion of any given brood of caterpillars, the remainder of the brood continuing on in the regular course. Even the portion which is concerned in it may be unequally affected, some arousing from the torpor at the end of a few weeks, and proceeding regularly thereafter with their transformations, others continuing torpid to and through the winter. This shows its direct relation to hybernation. The same phenomenon occurs in the chrysalis state, where sometimes early in the season a portion of a brood will disclose the butterfly, while another portion will retain the inmates until the succeeding spring, etc. But its occurrence in the active larval stage is far more unexpected.

"This lethargy in caterpillars was first observed by a French naturalist, named Vaudouer, more than sixty years ago, but his statements lay a long while nearly unnoticed. According to this observer (a full account of whose observations is given in my *New England Butterflies*), one of the European species of *Brenthis*, upon which he experimented flies in May, and again in July and August. The caterpillars from the second summer brood are half-grown when winter comes, hybernate in this stage, and, in time, produce the spring brood; the caterpillars of the spring brood, when they have reached the hybernating age, late in June, act in a precisely similar manner, and some of them do not arouse until the succeeding spring, when, with the caterpillars of the summer brood, they produce a new spring brood, but other



caterpillars of the spring brood, which become lethargic, awaken from their torpidity after a time, resume eating, undergo their transformations, and emerge as butterflies in July and August. This same feature occurs in some of our own species of *Brenthis* (*Argynnis*), as I have several times observed.

"The cause of this strange feature in butterfly life must be attributed, like all other points in their history, to the struggle for the perpetuity of the species. Should disaster befall the advance-guard who have not halted by the way, the sluggards can take up the work; the chances of survival are not doubled, perhaps, but greatly increased. Nature seizes upon some phenomenon in the life of each species, and turns it to its advantage; thus in the European *Brenthis*, it seizes on the caterpillar's habit of hybernation when half-grown, and forces the spring brood of caterpillars at that point in their growth to premature hybernation, in which some continue throughout the hot weather, and until the following spring."—ED.

## SOCIETIES.

THE ENTOMOLOGICAL SOCIETY OF LONDON resumed its meetings on Oct. 2nd, 1895. Mr. H. Tunaley exhibited specimens of *Lobophora viratata* from the neighbourhood of Birmingham. Specimens of the dark green form were shown in their natural positions on the bark, and specimens of the yellow form were shown on leaves on which they rested. Mr. J. W. Tutt exhibited, for Mr. Anderson, of Chichester, cases formed by a Lepidopterous insect received from the Argentine Republic, which he said he recognised as being either identical with, or closely allied to, *Thyridopteryx ephemeræformis*, which did great damage to many orchard and forest trees in North America. Mr. Tutt also exhibited a series of *Lycaena aegon*, captured by Mr. Massey, of Didsbury, on the Mosses in Westmoreland. The males were remarkable in bearing two very distinct shades of colour. The females also differed considerably from the form occurring in the south of England. He also exhibited, for Mr. T. Acton, a long series of *Hydroecia lucens*, captured in the Mosses near Warrington, and for comparison a series of *Hydroecia paludis*, and he read notes on the various specimens exhibited.—Another meeting was held on October 16th, when Mr. F. C. Adams exhibited a series of nineteen *Merodon equestris*, containing several varieties, showing their resemblance to wild bees of the family *Apidae*; also specimens of *Leptomorphus walkeri*, Curt., taken in the New Forest in September last, and *Melanostoma hyalinatum*, Flin. (male and female), from a series of eighteen, also taken in the New Forest in the latter part of August last. Mr. Adams further exhibited a specimen of *Spilomyia speciosa*, Rossi, from the New Forest. Lord Walsingham exhibited the type and paratypes of *Pseudodoxia limulus* (Rghfr.), together with the larval cases and a preserved larva. His lordship directed attention to the curious truncate concave head of the larva which forms an operculum to the tube, and remarked that the cases of this insect, which were apparently not uncommon in Ceylon, the larva feeding on mosses and lichens, had been known for some considerable time. So long ago as 1864 Mr.

McLachlan found them in the British Museum collection of cases of Caddis worms, and at that time, being only acquainted with the case, he was disposed to consider them the work of one of the *Leptoceridae*. In 1889 Herr Rogenhofer gave the name *Fumea* ? *limulus* to the case and its contents, and Mr. McLachlan agreed from the evidence then adduced that the insect was Lepidopterous rather than Trichopterous.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY met on October 10th, 1895, when the following among other exhibits were made. By Mr. McArthur: specimens taken by him this year in the Orkneys, among which were:—A series of *Thera juniperata* with a much whiter ground-colour, while the dark markings were intensified and somewhat extended; two almost white specimens of *Melanippe montanata*; three fine forms of *Nemeophila plantaginis*, one having much darker hind-wings, while another had yellowish-red hind-wings with fewer dark markings; *Epunda lutulenta* vars. *sedii* and *luneburgensis*. By Mr. Winkley, for Mr. Montgomery, of Ealing: specimens of a second brood of *Argynnis selene*, captured in August, in Abbot's Wood; also a specimen of *Lycaena bellargus*, from Eastbourne, in which the underside was very light, with the base blue and many of the usual dark markings obliterated, while others were extended. By Mr. R. Adkin: *Noctua depuncta*, from Morayshire. By Mr. H. J. Turner: a specimen of *Crioceris merdigera*, from Chattenden.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY, September 17th, 1895.—Exhibits:—Rev. C. R. N. Burrows: a series of *Apamea ophiogramma*, taken on sugar in his garden at Rainham; he remarked that the eggs of this species are laid in a row in a fold at the edge of the leaf of ribbon grass. Mr. Bayne: a small specimen of *Boarmia roboraria* from Epping Forest, and a brownish specimen from the New Forest, in which the usual peppering of small dots was wanting on that portion of each wing contiguous to the inner margin and anal angle; also a *Boarmia gemmaria* with a pale-greyish median area to the forewings. Mr. Bacot: a series of *Bryophila perla* from the Waterworks Wall, Lea Bridge, the specimens being very cleanly marked. Dr. Buckell: three series of *Eugonia quercinaria*, bred this year. The parents of Series I. were of the normal narrow-lined form, with few markings; their progeny showed a very slight melanic tendency. The parents of Series II. were darker, the male showing a strong leaning towards melanism in the outer third of the fore-wings; many of the male progeny showed considerable darkening on both inner and outer third of fore-wing, the females having the lines strongly marked, and in some cases showing a considerable sprinkling of dark scales. The parents of Series III. were a very dark male and a very pale female; the progeny were all dark (some extremely so), and many of the females had the outer third of fore-wings very dark. Mr. Nicholson also exhibited a short bred series of the same species. The parents were a male with outer third of fore-wings considerably suffused with a smoky tint, and a female with inner and outer thirds also very much suffused. All the females bred showed a strong melanic tendency in the outer third, except one, and all, except two, were dark on the inner third; the males all showed similar darkening, and one was entirely suffused with the smoky brown tint, especially on the inner and outer thirds.

Mr. Bacot, referring to a recent visit to Sandown with Mr. Prout, said that a mixture of raspberry jam and methylated spirits had proved more productive than the usual compound of treacle, rum, and jargonelle essence. They had taken, amongst many other species, *Leucania albipuncta*, *Aporophyla australis* (common), *Agrotis saucia* (abundant), and all the *Tryphænas* except *T. interjecta*.

October 1st, 1895.—Exhibits:—Mr. Oldham: a *Leucania albipuncta* from Folkestone. Mr. Clark: a New Forest specimen of *Cleora lichenaria*, about as large as a *Coremia ferrugata*. Mr. Tremayne: a *Mamestra brassicae* from Deal, which had a pale yellowish-grey ground colour and very distinct dark transverse lines, the usual dark mottling being almost entirely absent. Mr. Nicholson: a short series of males of *Ocneria dispar*, bred this year; one was strikingly marked with pale buff, and several others showed considerable variation in the same direction; the specimens varied in size from an inch and three-quarters to an inch and seven-eighths across the wings. Capt. Thompson: *Eubolia cervinaria*, bred from larvæ taken at Hornsea, Yorkshire. Mr. Bacot: a specimen of *Naenia typica*, in which the nervures were almost devoid of the usual white scales, especially towards the centre of the wing; also a very pale form of *Acronycta megacephala* approaching *A. aceris*, and a very dark specimen having a subterminal border of pale spots in the forewings. Mr. Tutt: *Lycaena aegon*, from Westmoreland, also *Dyschorista suspecta*, *Celaena haworthii*, *Hydroecia paludis* and *H. lucens* from Warrington.

October 15th, 1895.—Exhibits:—Mr. Nicholson: a specimen of *Mamestra brassicae* of an almost uniform lead-colour, the discoidal spots and subterminal line being of a smoky yellow tint. Mr. Tremayne: *Acidalia contiguaris* and other species from N. Wales. Dr. Sequeira: amongst other insects, a very fine pale banded form of *Cidaria siterata*, taken at ivy bloom in the New Forest. Mr. Oldham: a male *Odonestis potatoria* with female coloration, bred from a Cambridgeshire larva; also a living example of *Chelonia caia*, taken at Woodford on the evening before the meeting. Mr. Bayne: *Pamphila comma*, from Aylesbury, showing variation in the amount of suffusion with paler scales. Rev. C. R. N. Burrows: series of *Xanthia gilvago* and *X. circellaris*, from Suffolk, showing some beautiful dark varieties. He enumerated a list of 14 species, which he had seen at sugar, at Rainham, before he left for the meeting; these included *Calamia lutosa*, *Plusia gamma*, *Noctua c-nigrum*, *Caradrina cubicularis* and *Orthosia lota*. Mr. Bate: a living *Acherontia atropos*, which was easily induced to squeak. In quality of tone the sound resembled the cry of the corncrake in miniature, but it was repeated incessantly instead of twice at short intervals, as in the case of the bird. The vexed question as to the exact method by which the sound is produced was not settled, but the proboscis and palpi seemed instrumental in its production. Mr. T. W. Jackson: a very large bred variety of *Chelonia caia*, in which the forewings were very slightly marked with brown, and the hindwings were uniformly orange, except a blackish blotch near the apex. The left pair of wings were less distinctly marked than the right.

Dr. Buckell read a paper on "*Coenonympha typhon*," several of the members exhibiting their series of the insect.



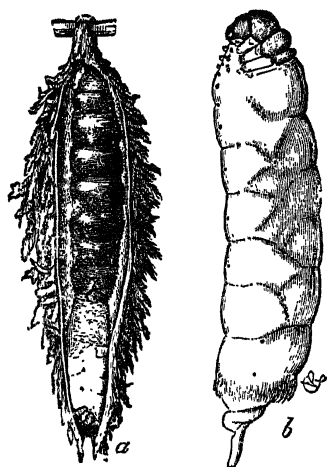


Fig. 1.

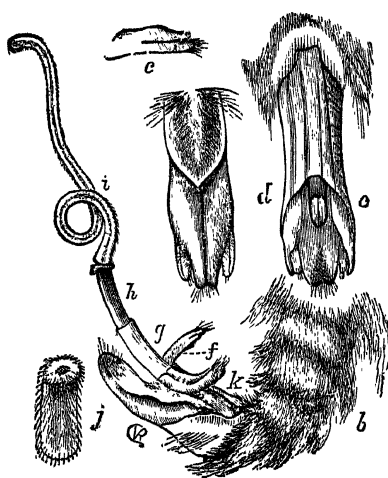


Fig. 2.

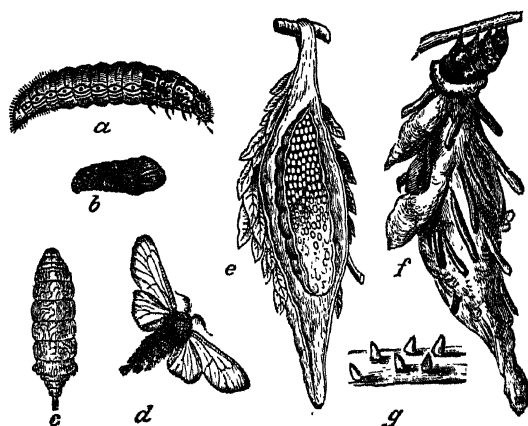


Fig. 3 (Nat. Size).

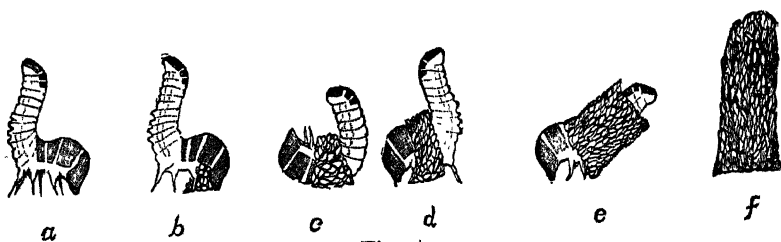


Fig. 4.

The Bagworm (*Thyridopteryx ephemeraeformis*, Haw).

Entom. Record, etc , 1895.

# The Entomologist's Record AND JOURNAL OF VARIATION.

---

VOL. VII. No. 6.

DECEMBER 15TH, 1895.

---

## The "Basket Caterpillar" and "Bagworm."

(With Plate).

By J. W. TUTT, F.E.S.

I received in August last, from Mr. Joseph Anderson Junr., of Chichester, a number of remarkable cases, varying from  $2\frac{1}{4}$  to  $2\frac{3}{4}$  inches in length, which had evidently been constructed by the caterpillar of some lepidopterous insect. These cases had been sent from the Argentine Republic, and Mr. Anderson informed me that the insect was known there by the name of the "Basket Caterpillar."

The cases were fastened round a twig (*vide*, Fig. 1 *a*; Fig 3 *e*). As the full-fed larva crawls along in the manner shown (Fig. 3 *f*), and evidently does not leave its case to fasten it thus when full-fed, it is clear that the fastening must be done when the caterpillar is inside, and the head towards the fastening. Unless the caterpillar turns round before pupating, it might reasonably be supposed that the head of the pupa pointed towards the fastened end. At the opposite end is a long loose cylindrical silken structure open at the extremities. That the larva does turn round was evident on dissection, for the head of the pupa was turned away from the fastening, and the cast larval skin, head, &c., which had come away when pupation took place, were at that end at which the case is fastened to the twig. I need hardly point out that this is what ordinarily takes place in *Psyche*: the species figured in the Plate being evidently not far removed from *P. villosella*, and is only insisted upon here to show that the abdomen is not towards the opening at the opposite end when copulation takes place.

On cutting open a case one sees that it is made of three layers: (1) a smooth inside layer of silk; (2) a middle layer of short pieces of stick bound together with a little silk; (3) a smooth outside layer of white silk covering the sticks. Inside the case is the pupal skin, the lower half filled with eggs and with material which I look upon as the desiccated body of the female (Fig. 3 *e*).

Taking some of these eggs in my hand, I found that many had already (August) hatched, that, in fact, although they bore every appearance of being eggs and were quite inactive whilst undisturbed, they were in reality larvæ which, as soon as they were liberated, were exceedingly active. They crawled about in the manner of *Psyche* larvæ with their tails in the air (Fig. 4 *a*), bearing considerable resemblance to a youngster walking on his hands with his heels in the air. There must have been many hundreds in each case, and the

liberated larvæ spun an incredible amount of silk for such tiny creatures. It is amazing how they can draw on their system to such an extent, for these larvæ were quite unfed. On hatching, they immediately begin to bite off scraps of paper, wood, or anything by which they find themselves surrounded, and, commencing with a necklace, gradually manufacture a case which, at last, extends beyond the abdomen and covers in the whole of the body (Fig. 4 *b, c, d, e, f*). When this process is complete they look like Fig. 3 *g*, which represents them at this early stage of development.

It fortunately happened that just at the time I was making these observations I received from Professor J. B. Smith, the *Report of the Entomological Department of the New Jersey Agricultural College Exp. Station for 1894*, in which there is a full description of a species called the "Bagworm" (*Thyridopteryx ephemeraeformis*), which does immense damage to shade, orchard and other trees in the United States, and the case of the full-fed larva and pupa (Fig. 3 *e, f*) was so like those received from Mr. Anderson that I had little doubt that it belonged to the same or to a closely allied species.

It is really remarkable how light these large cases are, yet the full-fed larva (Fig. 3 *a*) must have considerable strength to carry the case on its back. When full-fed the N. American larvæ show great disparity in size, and the pupa of the male (Fig. 3 *b*) is much smaller than that of the female (Fig. 3 *c*). The male is a small Psychid-looking moth (Fig. 3 *d*), but the female (Fig. 1 *a*) is a wingless whitish grub which does not leave its case. It is shown greatly enlarged in Fig. 1 *b*.

I am not at all clear yet as to how copulation takes place. Professor Smith writes: "She (the female) pushes her way partly out of the pupa, her head reaching to the lower end of the bag, where, without leaving the same, she awaits the male. The male has the tip of the abdomen remarkably modified to enable him to copulate with the female in this position, though when at rest no trace of the extraordinary development of these structures is manifest. Fertilisation being accomplished, the female works her way back within the pupa skin and fills it with eggs, receding as she does so towards the lower end of the bag, where, having completed the work of oviposition, she forces, with a last effort, her shrunken body through the opening, drops exhausted to the ground and perishes. When the female has withdrawn, the slit at the end of the puparium and the elastic opening of the bag close again, and the eggs thus remain securely protected till they are ready to hatch the ensuing spring."

The first paragraph of this quotation is exceedingly ambiguous, and leaves much to be desired as regards the *rationale* of the actual method of copulation. The structure of the male genitalia (Fig. 2 *b-i*) shows, indeed, a marvellous development and capacity to reach for some distance within the puparium. The female is shown (Fig. 1 *a*) in the act of working her way to the end of the puparium, where she evidently awaits the male. The larvæ of the Argentine species hatch in the autumn, but do not seem to come out of the puparium until disturbed. One puparium that I opened in August was full of young larvæ, which became active on disturbance, but the undisturbed cases gave no sign of life. Similarly, on Sept. 3rd, 12th, and Oct. 2nd, cases were opened with the same result; but one that I have opened this morning (Oct. 16th), previously un-

disturbed, is full of a yellowish silky fluff, but the larvæ had evidently emerged. The Argentine "Basket Caterpillar," therefore, differs from the United States "Bagworm," inasmuch as the former most certainly hatches in the autumn. Perhaps the difference in latitude would account for it.

As I have before pointed out, the extended male genitalia are shown much enlarged in Fig. 2 *b*, whilst Fig. 2 *c* gives a view of the organs from below, Fig. 2 *d* the same from above, Fig. 2 *e-j* showing further details enlarged.

We are indebted to Prof. Smith for the blocks which illustrate this article. Figs. 1, 2 and 3 are, however, made from the late Prof. Riley's original drawings.

### **Mesogona acetosellæ : a Noctuid new to the British List.**

By J. W. TUTT, F.E.S.

During last October, whilst sugaring in his garden at Arlington, Sussex, Mr. T. Salvage is reported to have taken a specimen of *Mesogona acetosellæ*, a species new to the British list. The specimen was exhibited at the last meeting of the South London Entomological Society, by Mr. R. Adkin, and there can be no doubt that it is quite distinct from any hitherto known British species. It was recognised at once by Mr. C. G. Barrett as *Mesogona acetosellæ*, Fab. (*Mant.*, 177), a species which has a wide range in Europe, occurring according to Staudinger in "Germany, Switzerland, South France, Northern Italy, Hungary, Dalmatia and Southern Russia."

There is no reason whatever then, so far as its distribution is concerned, why the insect should not occur in our southern counties, but in spite of its wide distribution it is a somewhat local species, and one is quite unable to suggest that it is a migrant, but prefers to think that, like *Dasyampa rubiginea*, *Orrhodia erythrocephala*, and a few other species, it has a permanent home with us, but is rare, owing to our being at the extreme north-west limit of its distribution. If this be so, the species should occur again, and probably is now to be found in southern collections under another name, having been passed by unrecognised. The species (according to Mr. Salvage's example) has the general appearance of a large specimen of *Taeniocampa stabilis* (it is as large an insect as *Noctua baia*), being of a fulvous grey tint with distinct stigmata, basal line and angulated line, all these being rendered more conspicuous by the possession of a bright ochreous outline or margin; the hind-wings are tinged on the outer margin with pink. My own impression of the species is that it is more closely related to *Xanthia ocellaris* than to any other British species, although Staudinger makes it follow *Pachnobia*, and to be almost immediately followed by *Dicycla*. As is well known, however, Staudinger's arrangement means nothing. There is a named variety of the species called *eremicola*, Kinderm., which comes from the Altai, and is diagnosed by Staudinger as "obsoletior, alis anticis strigis transversis totis nigris."

F. Guenée writes of this species: "Expanse of wing 40 mm. The fore-wings entire, rounded, of a fleshy-ochreous tint, powdered with fine black atoms; the two median lines paler and edged with blackish on the sides facing each other, the enclosed space between



them forming a trapezoid narrower at its lowest part; the subterminal line is composed of groups of blackish atoms, separated by rounded spots. The median stigmata (reniform and orbicular) are very distinct, large, regular, darker, encircled with paler. The median space is sometimes a little darker than the rest of the wing. The hind-wings of the same colour as the fore-wings, or a little more rosy, with a line and a faint blackish subterminal shade. Beneath, the four wings are of a pale yellowish-flesh colour, unicolorous and shiny. The species occurs in France, Austria and Hungary in August and September. The caterpillar is of a reddish-yellow colour, marbled with brown, with a fine median line; the trapezoidals whitish; the spiracular line is a little paler than the ground colour, and carries the spiracles, which are black; the head and the plate on the shoulder (1st thoracic segment) are of a deep brown. It feeds in May and June on different low plants" (*Noctuelites*, vol. v., p. 405). There is a figure of the insect by Mr. Frohawk in the *Entomologist* for December.

### On the Identification of *Acidalia dilutaria*, Hb.

I.—By LOUIS B. PROUT, F.E.S.

Thanks to the energy of Mr. Tutt and Dr. Chapman in collecting the needful material during their recent holiday in the Tyrolean Alps, I have had the satisfaction of clearing up the one dark place which remained after my synonymy investigations in the "*osseata*" group, reported in the *Record*, vol. vi., p. 131.

That dark place, it may be remembered, was with regard to the identity of Hübner's figure 100. Mr. Tutt has all along maintained that it was not a representation of *interjectaria*, Bdv.; and I wrote (*loc. cit.*, p. 132), "I am half inclined to agree with him that it does not represent either of our British species, but there is certainly no 'Continental species which we do not get' to which it could be referable." My very slender acquaintance with the range of variation of one of the Continental species which we *do* get, caused me to overlook the true solution of the enigma, and I shall now proceed to show that Hübner's *dilutaria* is but another form of *holosericata*, Dup.

The Continental material placed in my hands for study by Mr. Tutt consisted of a series of 15 specimens, mostly in rather poor condition, taken at Mendel on July 30th and August 2nd; and a lovely and variable series of 32 in fine condition, from the Sorapiss, in the Val d'Ampezzo, on August 10th and 12th. The worn specimens proved on investigation to be, as Mr. Tutt had conjectured, *A. humiliata*; though amongst them there are a few good specimens of *A. holosericata*, which, I suppose, was then just emerging. Concerning the Sorapiss species (which is entirely unmixed with *A. humiliata*), Mr. Tutt said, on handing them to me, that "he believed we had here the missing *A. dilutaria*, Hb.;" I replied by suggesting that they were vars. of *A. holosericata*; as it turns out we were both right, and may shake hands on it and congratulate one another on our acumen!

Mr. Tutt's fine Sorapiss series contains only one or two specimens which quite agree with Duponchel's description, "without discoidal spot

on either of the wings"; in many the spot is faint, in a few, again, it is quite distinct, though I think always more minute than in the allied species; some specimens have a slight tendency to darkening on the costa, though it is never at all pronounced; but two or three have fine dark outer margins, such as I never before saw in any of the three species in question; and one has all the transverse lines strikingly distinct and dark, yet the transitions are so gradual that it would be impossible to make separate species of them, even if they had not been taken at the same time and in the same locality. The dark outer margin and the dark transverse lines are especially important as helping to fix the identity of Hübner's *dilutaria*; they are two of the chief particulars in which it seemed so hard to reconcile his figure with *interjectaria*, Bdv.; but still more, the differently shaped wing in the said figure, with its prolonged apex, gave it a totally different aspect, but finds its counterpart in some of Mr. Tutt's series of *holosericata*.

It is by no means a new discovery that the last-named species has a variety with distinct central spots; Guenée made the discovery while his work was in progress, and records it in his addenda (*Ur. et Phal.*, ii., p. 548). But he probably did not again refer to Hübner's figure 100, which he had already made up his mind was his *interjectaria*. Specimens in the series from the Zeller collection, labelled Bergün, Preth and Raibl, have also perceptible central spots.

The six characters which Guenée specifies, whereby *holosericata* may be distinguished from its allies are: the perfectly rounded wings, the fore-wings more prolonged at the apex, the more clayey colour, the lines nearly equidistant, the concolorous costa, the absence of the discoidal spot. The fourth and sixth of these are found to be inconstant; the second and fifth certainly agree entirely with Hübner's figure of *dilutaria*; the colour of Hübner's figure is *not* good, and is partly responsible for my never even dreaming of associating it with *holosericata*; but I find that after all it really differs but very little from the two palest in Mr. Tutt's series.

In fine, with this series and Hübner's figure side by side before me, the conclusion is absolutely irresistible that they are specifically identical, the figure representing the extreme form with dark transverse lines, dark outer margin and distinct central spots.

Perhaps it may be well to add that our British *A. holosericata*, so far as I know it, appears to be a somewhat specialised local race, and to vary very little, if at all. I do not recollect ever to have seen it with the central spots more than very faintly traceable, and certainly never with the outer margin darkened. I fancy the tone of colour is also slightly more yellowish or brownish than in some of the Continental examples.

It would, I am afraid, be useless to endeavour to get the name *dilutaria*, Hb., restored to the right species; but there ought to be no great difficulty, in this country at any rate, in restoring the correct name *interjectaria*, Bdv. (which is still used by some British entomologists), to our much enduring "Bone Wave," ignoring altogether the name of *dilutaria*. But, to my mind, there is not the slightest doubt that the correct course would be to alter the name of *holosericata*, Dup., and let it stand thus:—*dilutaria*, Hb., fig. 100 (*nec al. auct.*); *stramentata*, Ev., *Bull. Mosc.*, 1842, iii., p. 566 (with central spots): *a. ab. holosericata*, Dup. (without central spots).

II.—By J. W. TUTT, F.E.S.

Mr. Prout's conclusions cannot be other than most satisfactory to me, proving as they do to the hilt my contention that Hübner's *dilutaria* was not synonymous with our *interjectaria*, in the face of the fact that Staudinger and all Continental and British authorities were against me. It is strange, however, to find the figure at last referred to *Acidalia holosericata*, but I have no doubt in Mr. Prout's conclusion, and would here thank him for the great trouble he has taken in the matter. At any rate, if this were the only scientific result of my summer holiday, I should have been well pleased.

I have further no doubt that Mr. Prout's separation of the Mendel Pass specimens into two groups is perfectly justified, and absolutely correct, for the specimens came from two different localities; one lot, the *A. humiliata*, from a steep rocky bit of ground just in front of the hotel where I stayed; the other, *A. dilutaria*, Hb. (*holosericata*), from the grassy slopes between the zigzags, which are locally known as "The Serpents of the Mendelstrasse." I only picked up the *A. humiliata* on one evening, when it seemed to be abundant. The limestone formation, and the general broken character of the ground, were not at all unlike those of the rocky cliffs at Freshwater, where alone, at present, the species has been found in England. Mr. Lemann took most of the *dilutaria* (*holosericata*) that were obtained at Mendel.

The locality for *A. dilutaria* (*holosericata*) on the Sorapiss was on some steep grassy slopes at the base of certain precipitous rocks, the slopes only extending for twenty or thirty feet before being lost in the rocky bed of a winter torrent, which was, however, quite dry in the summer time. This sheltered bank, facing down the Val d'Ampezzo, was the home of many other interesting species. As soon as we captured the first specimen here, I thought of Hübner's figure, (it only shows how these things haunt me!) and, in spite of the protests as to the *Erebias* we were losing, I insisted on a second visit, so that Mr. Prout could have enough material to work the matter out.

### The Re-occurrence of *Xylina lambda*, Fab. (*zinckenii*, Tr.) in Britain.

By J. W. TUTT, F.E.S.

The capture of a fine specimen of *Xylina lambda*, Fab., on September 30th last, has again raised an interest in this rare British insect. Its early history as a British species was largely of an unsatisfactory nature, as no entomologist of repute seems to have examined the specimens, two of which came into the hands of the well-known dealers, Messrs. Meek and Cooke respectively, although their conclusions were supported by Dr. H. G. Knaggs. Neither Messrs. Stainton, Newman, nor any of our leading lepidopterists appear to have seen the insects, and hence the exhibition of a freshly-caught specimen by the Rev. J. H. Hocking (the capture being made on September 30th last, at Copdock, near Ipswich), at the meeting of the Entomological Society of London, is in every way satisfactory.

The history of the hitherto reputed British specimens is briefly this :—

- (1) Dr. Knaggs writes (*E.M.M.*, vol. iii., p. 163):—"Mr. Meek has

just placed in my hands for identification a very handsome NOCTUA. It is the *Xylina zinckenii* of Treitschke, and was taken by an incipient entomologist last September, in the neighbourhood of New Cross." Referring to the same specimen, Mr. E. Newman says (*Entom.*, vol. iii., pp. 203-4): "A single specimen . . . is reported to have been taken by Mr. Harrington on the trunk of a willow tree near New Cross, on September 30th last."

(2) Mr. Newman writes (*Entom.*, vol. iii., p. 227): "No sooner do we hear of a specimen of this novelty occurring at New Cross than a second has been taken at Guildford; it was sent up unnamed to Mr. Cooke, of Oxford Street;" whilst the Hon. Spencer Canning (apparently the captor of this second specimen) writes (*E.M.M.*, vol. iii., p. 235): "In the note I sent you some time ago I mentioned having caught a NOCTUA of which I had not then found out the name. I took it to an entomologist, and he wrote back that it was the new species, *Xylina zinckenii*. It was taken at sugar on a young elm tree in the month of October, between Dorking and Guildford."

(3) Mr. J. Moore writes (*Entom.*, vol. v., p. 204): "I have to record the capture of a most splendid specimen of *X. zinckenii* at sugar, in Darenth Wood, on the 3rd of October. I took it from the reverse side of the tree to that which I had sugared. I was accompanied at the time by Messrs. F. Standish, Pryer and other friends."

(4) The following must be amongst the earliest captures of this rarity (*vide*, *E.M.M.*, vol. v., p. 252): "A brother collector, a neighbour, lately brought me a present, which he and his friends at the time (October, 1865) considered a strange example of *Acronycta psi*. At this date it may be borne in mind that Dr. Knaggs had not identified anything British-born with *X. zinckenii*. It appears that my friend was out pupa digging in the northern environs of London, when, rising from the root of a poplar, he was surprised to observe this fine example of what struck him as one of a second brood of *A. psi* at rest upon the bark. He had neither pill nor collecting-box—merely a small cradle for his 'diggings.' However, he fortunately had a pin and a cylinder hat, in which the illustrious stranger was duly installed. Until kindly taken out for me, it has ever since remained in his duplicate box."

(5) Mr. Carrington writes (*Entom.*, vol. ix., p. 191): "Mr. Bond has a fine example of *X. lambda*, taken near Erith, in September 1875, by Mr. W. Marshall."

The above five are the only British specimens known besides the recent capture. Full descriptions of the vars. *sonniculosa* and *zinckenii* occur in *The British Noctuae and their Varieties*, vol. iii., pp. 99-103. The variability is so great that the insect may easily be overlooked, and its different forms should be carefully borne in mind by collectors; but most of the British specimens are, so far, of a form bearing a distant superficial resemblance to *Cuspidia psi*, to which Fabricius a century and a quarter ago likened it. Of course this resemblance is purely superficial. A close examination shows that it is structurally very different—in shape, markings, general build, &c.

### ***Lycæna ægon* var. *corsica* on the Westmoreland Mosses.**

By HERBERT MASSEY, F.E.S.

Sooner or later, no doubt, we shall have to add *Lycæna argus* to

the British list. Its nearness to *L. aegon* is so remarkable, that one would not be surprised to hear that a large number of the specimens going under the latter name in our collections were, in reality, the allied species. A slightly bluer tint, a less pronounced dark margin, narrower fringes, the absence of the small spines on the front tibiae, and the slightly straighter row of black spots just outside the central spot on the underside of the hind-wings are all characters so slight, that it is not surprising that the best of lepidopterists express their inability to separate the species with any degree of certainty. When we add that Anglia is the only country in Europe in which *L. argus* does not occur, we need scarcely be surprised that Staudinger, in his *Catalogue*, p. 10, questions his own record that *L. argus* does not occur in this country.

When, therefore, I captured a long series of a *Lycaena* in Westmoreland, the males of which were distinctly bluer, the dark margin comparatively narrower, and the females all shot most exquisitely with the male coloration, I had doubt whether *L. argus* had not come into my possession.

This has ultimately proved not to be so, but still the possibility of the species occurring in this country is so great that it is perhaps a sufficient excuse for the above notes.

The males which I have captured vary in colour from those having a distinct *aegon* tint (with just a trace of red in it), to the blue which characterises *argus*. The dark marginal border is narrow, and in some specimens restricted to a fine line, with dark nervures showing on the outside of the wing. The hind-wings in all the specimens present a more or less complete row of marginal black dots, separated by the fine black nervures, and, in some specimens, edged externally with paler—one specimen shows a pale coloration along the costa, and at the upper part of the outer margin of the hind-wing. The undersides of the fore-wings of the males may be described as pale grey with blue bases, with but little orange on the marginal border, and with slight variation in the size of the spots forming the transverse angulated row crossing the fore-wings. The hind-wings are characterised by a white band between the marginal row of orange spots and the transverse row of black spots, the latter of which in the antepenultimate spot shows some tendency to vary; in some specimens being much higher, in others more in a line with the remainder.

The upper side of the females is most remarkable, the fore-wings being blue at the base, the colour extending to the centre of the wing, and reappearing again as a transverse shade reaching from the costa to the inner margin, leaving the broad brown outer marginal band, which is so characteristic of the male *L. aegon*. Faint traces of orange spots are sometimes present in this outer marginal band. The hind-wings are shaded entirely with blue, which is of two tints, as in the males, the more purple *aegon* tint and the bluer *argus* tint, the latter very bright and characteristic; a series of marginal spots is present in all the specimens, but the quantity of orange present is distinctly limited.

The undersides of the hind-wings of the females are characterised by the distinct white band which traverses all the wings between the orange marginal band and the transverse rows of black spots, and also by the strong development of the silver studs in the orange bands. There is also some variation in the transverse band of spots on the

hind-wings, the antepenultimate spot being well raised out of the level of the others (an *ægon* character) in some specimens, whilst it is almost in a line with the other spots (an *argus* character) in other specimens.

In colour the undersides are pale grey with a brownish tinge, but with scarcely a trace of greenish blue at the base (completely absent in some).

I am informed by Mr. Tutt that my specimens are almost identical with some examples of *L. ægon* that he received from Mr. Nicholson, of Lewes, as var. *corsica*, Selys-Longchamps. He states, however, that my females are apparently even better supplied with blue than in this beautiful variety, at the same time it is near enough to be included under the same varietal name. It would appear to be an exactly parallel form to that of *L. argus* ab. *argyrognomon*, which Staudinger diagnoses as "female, blue above."

These specimens were taken in Westmoreland, close to the Lancashire border. They are only found in the wettest part of the Mosses, are extremely local, and fly very little. On my last visit this year I found that the peat cutters were at work, and had made a deep trench on one side of the Moss; this will have a serious effect on the Moss, and we shall see whether it will have any effect on the insect. I have never observed a female of the uniform brown shade, which is usually characteristic of the South of England specimens. The larvæ I have not yet been able to take, not having had the opportunity of getting to the Mosses at the right time; the food-plant also I do not know, but as there is plenty of *Ornithopus perpusillus* on the Moss, they probably feed on that. When I remarked that they are extremely local, I must mention that although I have worked many similar bits of Moss to the one mentioned above, I have failed to find them, but as there is an enormous tract of country in this particular part of Westmoreland, similar in every respect to the one on which I found these insects, that has never yet been explored by any entomologist, it is quite possible they may not be so local as I suppose. I first found them on August 1st, 1892; in 1893, on July 14th; in 1894, July 20th; and in 1895, they were in perfect condition on July 14th.

### The South London Entomological Society's Exhibition.

By J. W. TUTT, F.E.S.

If one dared prophesy, one would have said that two successful entomological exhibitions could not possibly have been held in one year. But it is "the unexpected that always happens," and on the evening of October 17th the South London Society came near to equalling the City of London exhibition at the commencement of the year, an exhibition which will probably stand unrivalled for some time as indicating what a brilliant and intelligent assembly of men and women interested in entomological work can be collected together in London, and what an advance the interest in biological science has made amongst all classes during the last quarter of a century.

To "write up" the Society's exhibition would be impossible, and serve no good purpose; a short note, to occupy such space as we can spare, must do injustice to many, less than justice perhaps to all. It will only be saying what is already assumed when we mention that

the excellent president, Mr. Hall, and the unequalled secretaries, Messrs. Edwards and Turner, surpassed themselves. That the excellent collections of Messrs. Billups, C. Briggs, Adkin, Hall, South, J. A. Clark, Turner, C. G. Barrett, S. Edwards, and other leading lights of the South London were strongly represented, goes without saying; that Mr. Leech's marvellous collection of Palæarctic Lepidoptera, Mr. J. A. Cooper's bird's eggs, probably the most scientific collection in the country, Mr. J. T. Carrington's shells, together with a large collection of botanical specimens, charts representing insect life in its economic aspects, a collection of freshly-gathered fungi, and the lectures of Dr. Cooke and Mr. Enoch added to the educational value of the meeting, will be already conceded.

Socially, one meets many friends from the provinces that one sees at no other time, and even for this purpose the exhibitions are to be praised, and the enthusiasm of the provincials is often remarkably contrasted with the custom of a large number of entomologists who live in the metropolis, and are yet as much strangers as if they lived at the North Pole, but who turn out methodically at the exhibitions to exhibit their "Gooseberry" moths and "Tigers," their black "Admirals" and leaden-coloured "Blues," and to do other equally kind things when an important occasion demands the sacrifice.

Putting aside the "wholesale" part of the exhibition, there were many fresh and excellent things to observe. Among others the Shetland and Scotch insects exhibited by Mr. Bright—marvellous *Hepialus humuli*, variable *Crymodes exilis*, *Sciaphila colquhounana*, dark *Noctua glareosa*, rare *Crambus myellus* and *Sesia scoliformis*. Then the excellent work of Mr. Hamm, of Reading, was well illustrated by *Sesia sphegiformis*, *Stauropus fagi* of great variety, charming *Xanthia aurago*, although the finest vars. of this species were exhibited by Mr. Chittenden—yellow, with no central stigmata whatever. Across the table Mr. J. A. Clark discoursed on the absurdity of men saying that they could not see well enough to set *Micros*, when, with a wonderful lens he exhibited, he showed that one could set out *Nepticulæ*, which looked almost as large as Blues. What is to be said of the charming Thais and Anthocharids of Mr. A. H. Jones, and endless other fine things, or the little boxes that people dragged out of the deepest recesses of their clothing—this one containing a couple of charming *Xanthia ocellaris*, that a superb freshly-bred specimen of *Cucullia gnaphalii*, or a variety of *Mamestra brassicae* that hardly anyone can name, a specimen of *Argynnis selene*, with scarcely any dark spots, and so on.

The feature of the show was variation. Say what you like, but that is the pivot on which the whole feeling of entomologists moves; each one exhibits his varieties. Here and there branch issues crop up. There are Mr. Merrifield's specimens exhibiting the variation resulting from his temperature experiments, here are some marvellous hybrids of silkworm moths bred by Miss Emily Morton, whose name so often figures in our exchange column. These indicate, as surely as the shadow moving across the face of the sundial, the onward progress of time. The collector may still ransack fen and hill, moor and moss for rarities which will bring in a consideration for his trouble some day, but he is being left behind by his contemporaries, who get more enjoyment than "coppers" out of their specimens.

We have neglected much, and shall have offended many. Who can describe the pathetic pleasure of two collectors of thirty or forty years' standing who have at last got a large healthy pupa of *S. convolvuli*, which they hope to breed some day? They miss the scientific value of the observation, *viz.* : that this proves that the species tries to pass the winter with us as it passes the winter on the Continent, but, owing to the late emergence of the autumn specimens, usually fails. What matters it if they leave the science to others? Their hearty enjoyment is of the healthiest and most honest kind.

We would write more if we dared; we would contrast Mr. Mitchell's strange *Vanessa urticae* with those bred by Mr. Merrifield; we would hint that a stranger would leave the room honestly convinced that the Jersey Tiger was the commonest British moth, that all Meadow Browns had pale patches, that all Silver-washed Fritillaries had yellow spots on the wings, or were of the var. *ralesina*, that all specimens of *Tephrosia bimaculata* were black, and that all *Nemeophila plantaginis* had red, white, or almost black hind wings. It is only the specialist who recognises that each has brought his specialities, that there are no ordinary types, but only the aberrations served up for the visitor's delectation, that there are no commoners, only varieties brought for his enjoyment.

We can only reiterate our hearty thanks to all concerned for a most enjoyable evening, and only hope that Messrs. Hall, Adkin, Edwards and Turner were satisfied with the result. One word of regret is unavoidable, *viz.*, the absence of the vice-president, Mr. J. Henderson, due to an illness which has prostrated him during the greater part of the summer. May he quickly recover is the earnest wish of all his fellow members.

---

### Sphinx pinastri in Suffolk.

By the Hon. F. THELLUSSON.

So far as has come under my notice, the first specimen of *S. pinastri* taken in Suffolk was captured by Mr. Long, at Waldringfield, in 1876, and another was taken by him at Tuddenham, in 1877. The next record, so far as I know, is of a larva taken by the Honourable Mrs. Carpenter, at Leiston, in 1880, but I do not know whether she reared it. The late Dr. Hele, of Aldeburgh, states that he found the first specimen in 1879, near Saxmundham, and that in 1881 he took 40 specimens near Aldeburgh. This, however, I would not care to vouch for. The Rev. Mr. Walb has, I believe, also taken two or three specimens. These are all that I know of as having been recorded from Suffolk. My own experience of the insect in Suffolk began in 1891, when my father (Lord Rendlesham) and brother one day discovered two specimens on the trunks of firs. Returning to the same place the next day, they took about a dozen specimens, and left several more worn ones there. This was in August, and therefore rather late. From these we obtained eggs, from which I bred about sixty larvæ. I gave Lord Walsingham about eight of these, which he reared, and some are in his collection in the Natural History Museum at South Kensington. The next year I took none, but in the succeeding years have always taken some. This year, for the first time, I have beaten the larvæ,



and have also dug the pupæ, which were just below the surface of the ground.

The larvæ are most variable in their colour; some are bright green, others in their last two skins vary from green to brown, whilst others are quite purple in colour. They seem to be fairly easy to rear, the most dangerous periods being the first and last moults. I had nearly one hundred larvæ, but lost a great many through feeding them on food that was too green and succulent, as they got diarrhoea and turned almost to water. They feed exclusively on the pine, beginning on the top of the firs and eating downwards to the stalk. In confinement they appear to eat both night and day.

The moth appears in June (the earliest taken was on June 8th), and seems to go on until the end of July, although worn specimens may be taken in August. It is very sluggish in the day-time, when it sits on the trunks of the fir trees and will not fly even when moved off the trunk, but drops into a box held underneath it. I have only known one specimen to fly away when disturbed. I have several pupæ, and intend next year to take a female into the woods and see if the males will assemble late at night.

### **Sphinx pinastri as a British Insect.**

By J. W. TUTT, F.E.S.

It has often been stated that, to a very great extent, pines have been introduced into England, and that, as a result, several of the pine-feeding species of Lepidoptera now commonly found, could not have been really indigenous, but must have been imported with the trees. Like the trees, however, many of the pine-feeding insects have grown and prospered, and are now among the commonest British species.

One pine-feeding species of Lepidoptera, however, troubles even yet the entomological conscience. This is *Sphinx pinastri*. This large beautiful insect is, in its imago state, so readily seen near the roots of the pine that it is altogether impossible for keen collectors to overlook it in the districts which they so carefully work; yet, until about a dozen or fifteen years ago, the right of this species to be considered British rested on the most slender authority, and this, in spite of the fact that it is probably the most abundant *Sphinx* moth in all the pine forests of Europe.

Donovan, as far back as 1800, refers to a "traditionary report" of *S. pinastri* being British, the locality from whence the specimens came being the gloriously vague one of "Scotland." His next remark gives food for reflection, that "as it is generally admitted on that (traditionary) authority to a place in the cabinets of English insects," he cannot refrain from giving it a place in his *Natural History of British Insects*. Haworth, in 1803, mentions that it occurs in "the month of June," and that it is to be "found on the trunks of pines," and is taken "near London, very rarely." Stephens, in 1828, gets nearer, for he mentions "one specimen taken in June, near Colney Hatch Wood, about 80 years ago, and a second in the neighbourhood of Esher." This takes us back to Haworth's time, and probably affords the clue as to the amount of his (Haworth's) information about this species. Stephens, however, says that at "Rivelston Wood, near Edinburgh,

one specimen was taken by Dr. Leach, and several by Mr. Wilson, of the College." In *Entom.*, vol. vi., we find records of single specimens at Crewkerne, in Somersetshire, and another in Devonshire, in September, 1861, the latter date a most marvellous one for a June species, and the record is more than probably due to imperfect knowledge.

We now come to the Eastern Counties' locality. In 1872, Mr. Higgins records a specimen from Harwich in June, probably the first reliable specimen from the now famous Suffolk locality. Mr. Long (or Tong) captured one at Waldringfield in 1876, and another at Tuddenham in 1877, whilst other specimens were recorded from "near Ipswich," "Wickham Market" and "near Woodbridge." In *Entom.*, vol. xiv., "Ipswich" again comes to the fore, whilst Herefordshire also produces a specimen, but, previously to that, Mr. Carrington (*Entom.*, x.) had recorded one as "bred" in the Eastern Counties, and another from "Deal."

In *Entom.*, xv., p. 114, Mr. Carrington, speaking generally in connection with the introduction of rare British species, states that some people "have suggested that we should get European pupæ and put them down in places where local insects occur, 'to improve the breed.'"

In *Entom.*, xv., p. 210, two remarkable records appear of which Mr. Carrington writes: "As editor of this magazine I have received the following letters, which will speak for themselves. Is it possible those correspondents have come across an instance of the amateur colonisation referred to (*Entom.*, xv., p. 114) by me recently?" These letters are dated respectively July 20th and 21st, 1882. In one the writer states that himself and a friend have captured "several pairs of *S. pinastri* in one of the Eastern counties," and asks for information as to "how to dispose of them to collectors." The other writer states that two friends and himself have "taken some specimens of *S. pinastri* in this county during the last fortnight." He further states that they "are desirous of selling some of them," and "would offer the insects at — per pair," and asking Mr. Carrington's advice as to "what should be asked."

This damned *S. pinastri* for a time, and all of us who were anxious about the purity of the British fauna, thought that *S. pinastri*, as a British species, had received its death blow. So impressed was I with the fact that *S. pinastri* had been "planted," that when that excellent collector, Mr. Coverdale, a close personal friend of mine, obtained specimens I strongly insisted on their worthlessness, and so far convinced him that he took no further interest in what would otherwise have been a notable capture.

But *S. pinastri* was not done with yet, and after the record of another at Ipswich, by Mr. Ager, on July 23rd, 1882, Mr. Cooper came to the front in its defence. His letter was sufficient to make me review my previous opinion, and since Mr. Cooper wrote his memorable note in *Entom.*, vol. xix., p. 14, I have been a firm believer in the authenticity of the Suffolk *S. pinastri*.

This is what Mr. Cooper wrote:—"During a recent visit to Aldeburgh, Suffolk, I had the pleasure of making the acquaintance of a British larva of *S. pinastri*, which was in the possession of Dr. Hele, who has been successful in the capture and breeding of this rare

insect. On enquiring into its history I was informed by Dr. Hele that in June last (1885) he had taken at rest upon a pine tree a crippled female, which laid two fertile eggs, from which he obtained two larvæ. One of them died, but the other one was successfully photographed the day before it went to earth. In addition to the specimens of Dr. Hele, I saw one which was captured at rest near the church by the son of the vicar. I may own that at one time I was sceptical as to the genuineness of the title of this species as a British insect, and that before my visit to Aldeburgh I regarded the alleged capture as a possible imposture; but incredulity has given place to conviction, and I consider that the position of *S. pinastri* in our fauna is materially strengthened. It has, I have been informed, been suspected that it may have been accidentally imported, or otherwise. I am positively assured by Dr. Hele that there is no ground for believing that there has been any attempt to acclimatise or artificially introduce the insect, and as far as I am able to ascertain there is no evidence of such an attempt. Isolated specimens have, it is true, been captured at Ipswich and elsewhere, but I may say that the spot where the largest number have been taken is not favourable to the view of an artificial introduction, it being inaccessible to dealers, who might have a motive to deceive, and to the public generally. It is possible that *S. pinastri* has for centuries inhabited some of our pinewoods where it occurs now from year to year; but this must be an open question; and it is, perhaps, more probable that it has, like some of our other rare Sphinges, made our country, from time to time, the land of its adoption. I submit that although its appearance is, perhaps, more local, it has with them an equal claim to be recognised as a British species."

What Mr. Cooper said then remains perfectly true now; we are no nearer to any exact knowledge of the date when *S. pinastri* first came to Britain, whether before the time that the North Sea separated us from the Continent (a few thousands of years ago), whether with the first artificial introduction of its food-plant into Suffolk (probably several hundreds of years ago), or with a later importation of firs, or by means of a more recent immigration. All these are things which resolve themselves into guess-work, but have no scientific value whatever.

Mr. Cooper's note brought two other Scotch records from Mr. Edwards, one of a larva found in "Mull, in September, 1860, near Achmaeroish," which produced an imago on July 24th, 1861; a second larva being taken in the same wood in September, 1861, but this died.

The publication of the Rev. E. N. Bloomfield's *List of the Lepidoptera of Suffolk*, brought us more news about *Sphinx pinastri* in its Eastern county habitat. Here we learn of the occurrence of the Tuddenham St. Martin specimen, captured in 1877, of two Waldringfield specimens in 1878 and another in 1879, of one at Saxmundham in 1879, and at Ipswich in 1881 and 1882. But Mr. Hele's note is the interesting part of this entry. He writes:—"In July, 1881, a specimen was taken in the Vicarage grounds here, on the wing, in the vicinity of some honeysuckle. During the months of July and August in the following year we captured about forty specimens in this neighbourhood. We found them at rest on the trunks of the Scotch firs, from four to about fourteen feet from the ground, in every aspect, apparently without regard to wind or weather." Mr. Bloomfield adds

that "until the last two years (1889-90), Mr. Hele has not failed to take a specimen or two every year."

Nothing more was really wanted to establish the British nationality of *S. pinastri* beyond doubt, but if anything could add stability to the general conclusion of the authenticity of *S. pinastri*, it is to be found in the fact—that for the last five years in succession Lord Rendlesham and his son, the Hon. F. Thellusson, have taken the insect regularly in more or less abundance, have obtained ova, from which Lord Walsingham, as well as themselves, have bred imagines, and, during last autumn, succeeded in beating the larvæ.

There can, indeed, be little doubt, if any, that *Sphinx pinastri* is a sedentary native, and therefore more entitled to rank as British than our migrating *S. convolvuli* and *Deilephila galeii*, or our lost *D. euphorbiæ*. All I would add is that if anyone can show just cause and impediment why *S. pinastri* should not be considered a native of our Islands, let him declare it.

### Notes on *Noctua festiva* (Hübner), and *Noctua conflua* (Treitschke)\*.

By FREDK. J. HANBURY, F.L.S., F.E.S.

I had intended on the present occasion to have merely exhibited my series of the above-named insects, adding a few remarks that I thought might be of general interest. I was asked, however, to put such remarks into definite shape, in order that they might be available for reference in connection with the much-disputed point as to whether insects placed under the above names are to be regarded as distinct forms, or whether the names should be considered merely as representing the extreme states of one excessively variable type.

Into the much greater question of what constitutes a species, I have not the least desire to enter. I have heard enough discussion on this point, in other branches of science, to make one very shy of attempting to dogmatize on a question that frequently resolves itself, in the last resort, into one of individual opinion. All that I wish to do is to endeavour to put before you such facts as my limited opportunities for observation have afforded, in order to help you, if possible, to come to a decision as to whether the name *Noctua festiva* represents a definite and permanent form, which, though excessively variable, may yet be distinguished with certainty from an equally variable yet definable form which is symbolized by the name of *Noctua conflua*, Treitschke.

A first necessity in determining such a point is to have adequate material on which to form an opinion, and I am greatly indebted to Mr. Tutt for the loan of his entire series which, so far as *Noctua festiva* is concerned, represents a considerably larger number of localities than my own, whilst the set of both bred and captured specimens of *Noctua conflua* that I have recently accumulated is perhaps as extensive and representative as any I have seen. In the exhibit before us we have 271 specimens placed under the name *Noctua festiva*, and 166 specimens, picked from a much larger number, to represent *Noctua conflua*. The drift of my further remarks may perhaps be better

\* A paper read before the City of London Entomological and Natural History Society, November 5th, 1895.

understood if I here state that I have placed Shetland specimens only under the name *confusa*, and I find that Mr. Tutt has taken exactly the same line. The series before us will, I think, show that the confusion that has for so long existed has mainly arisen through certain forms from Scotland and the North of England being placed under the same name.

Before laying before you any further results of my own observations, and the conclusions to be deduced therefrom, it will be best to endeavour to realise exactly what insects the authors of the above names intended to designate. I am much indebted to Mr. Kirby, of the British Museum, for his kind help in this matter.

Turning then to the early authorities, there appears to be considerable doubt as to what name should stand for the insect now almost universally known as *Noctua festiva*, Hb. The case, so far as the limited time at my disposal allowed me to investigate it, stands thus: Fabricius in 1775, under the name *N. mendica*, published the following description: "*N. cristata*, alis deflexis, pallide incarnatis; macula media fusca: stigmatibus flavis." . . . . "*Thorax fuscus*, margine antico albicante. Alæ anticæ subincarnatæ, strigis plurimis undatis, fuscis. In medio alæ macula magna fusca, et in hac stigmata ordinaria flavissima, anteriore orbiculato, posteriore reniformi, subtus flavescentes striga fusca."

Werneburg recognizes that this description applies to our *N. festiva*, and allows Fabricius' name on the ground of priority. Staudinger merely puts "*? mendica*" as a synonym for *N. festiva*. In the following year Schiffermüller\* briefly described a species under the name of *Noctua festiva*, thus "a dark red and pearl coloured Noctua, with an unknown larva." Although Schiffermüller says the larva is unknown, he nevertheless places his species in a class distinguished as having cannibal larvæ. We now come to the name at present in use, viz.: *Noctua festiva*, Hübner. Hübner publishes an excellent drawing in an early number of the *Sammlung europäischer Schmetterlinge*, von Jacob Hübner, pl. 24, fig. 114 (published in Augsburg from about 1798 to 1841), and later three other figures 467, 468 and 469; but this appears to be one of several, if not many, species drawn by him, but never described, at least so far as my investigation went. The earlier figure excellently represents the red form, having paler bases to the wings, and the dark quadrate spot between the stigmata, while the later figures represent various brown forms. The question of nomenclature seems in this instance to be narrowed down to this, viz., is a moderately good description without a drawing, or a good drawing without a description to take precedence? The great probability appears to me to be that Hübner merely drew an insect already well-known under Schiffermüller's name, and in doing so removed any possible ambiguity that may have existed on the subject. Of course if type specimens exist showing what either Fabricius or Schiffermüller intended, they would settle the question. As Treitschke was the author of the name *confusa*, it may be well before proceeding to discuss that species to give his brief diagnosis of *N. festiva*, published in *Die Schmetterlinge von Europa*, von Friedrich Treitschke, 1825, vol. v., pt. 1., p. 224, "*N. alis anticis pallide incarnatis, macula media fusca, stigmatibus duobus*

\* *Systematisches Verzeichniss der Schmetterlinge der Wiener Gegend.*—Denis and Schiffermüller, Vienna, 1776.

flavis, conico apice atro." Two years later, in vol. vi., pt. 1, p. 405, under the generic name *Apamea*, he published *conflua* as a new species.

It may interest some of those present to know that the laws of botanical nomenclature are wholly different from those governing the use of entomological names. In the former branch of science, when a generic name is altered, the author who first places the species under the revised generic name is deemed to be the author of the specific name, whilst in entomology the name of the author of the species stands, no matter to what genus it may be subsequently transferred. The case before us illustrates my meaning: Treitschke called his moth *Apamea conflua*, but now that it is transferred to the genus *Noctua* it is equally described as of Treitschke, thus, in fact, representing Treitschke as saying what he never did say, for he never called his insect *Noctua conflua*. But matters have gone too far in both sciences to attempt to enforce a uniform law, highly desirable as such uniformity would be, and we will dismiss the subject with the happy compromise that if the botanical law is the more moral, the entomological undoubtedly possesses much to recommend it on the grounds of expediency and convenience.

But to return to our subject, Treitschke's short diagnosis runs thus: "*Ap. alis anticis hepaticis, maculis ordinariis pallidioribus, strigis obsoletis confluentibus.*" He then proceeds to describe how about sixteen specimens were taken in the Riesengebirge, adding that the males fly by day, but that the females are very retiring, and that the following description, of which I give the translation from the German, is drawn up from a well-marked pair selected from the sixteen specimens above referred to: "*Conflua* is not much bigger than *Apamea strigilis*, the body is reddish leather colour, very woolly on the back and collar, the abdomen is paler, with a reddish anal tuft in the male. The male has pale brown strongly pectinated antennæ, and the female long filiform ones. Legs, brown ringed with yellow. The forewings are liver-coloured, more or less mixed with yellow or brownish-red, the yellow is generally most distinct on the costa and stigmata. Nothing is visible of the transverse lines but a few blackish dots; the orbicular stigma is very large, pale; below it, in the position of the claviform stigma, is a little black dot; the reniform stigma is also large, and before the beginning of the two stigmata lie two dark reddish-brown and generally triangular marks. Before the paler fringes runs a suffused yellowish zigzag line, then follows a series of blackish brown streaks. The hind-wings have, on a yellowish ground, blackish brown dust and yellow reddish fringes. The underside is yellowish white, most dusted with black towards the base of the wings, the nervures are here raised."

Three years later C. F. Freyer published an excellent drawing, also taken from one of the Riesengebirge specimens, in his *Beiträge zur Geschichte europäischer Schmetterlinge*, vol. iii., tab. 98, fig. 1., p. 8, 1830. He compares it with *festiva*, stating that it is smaller and nearer to Hübner's *quadratum*, and that when reared it still has a different look from that of *festiva*. In this latter remark I entirely concur, and I think a glance at the large series before us will evoke a similar conclusion among those present. Quite as great a distinction is seen between the Continental series of both forms to be found in the British Museum collection. A point of much interest is the practical identity between

the specimens found in the Riesengebirge, a range of mountains in Silesia, and those taken in Shetland. There is much in common between the flora of the Riesengebirge and that of our Scotch mountains, several critical *Hieracia* being practically indistinguishable when gathered from the two localities, which are so widely separated geographically. The European distribution of *conflua*, as given in the work of the two Speyers, is of interest; translated it reads: "Previously only known from the mountainous regions (Sudeten), and the Arctic regions, but lately also in Switzerland, in the plains of lower Saxony, in Belgium and in South Sweden, unless some of these determinations have been erroneous. In the high mountains of Silesia the larva feeds on *Polygonum bistorta*. Iceland everywhere, and very common. Scandinavia (in Schonen very rare). Archangel and Belgium? rare." I have seen no specimens from the southern countries, and until I do shall feel very sceptical as to its occurrence in Belgium, etc., but what is to the point is that one typical and characteristic form extends in a direct line from the Riesengebirge, through Southern Scandinavia and Shetland, to—what may perhaps be considered its headquarters—Iceland.

The Museum series shows *conflua* to be a uniformly smaller and dingier species than *festiva*, though some of our own northern forms of the latter do not materially differ as regards size.

The Speyers give the distribution of *festiva* thus: "In most districts in the north half of our district, less widely in the south. It frequents woods and damp places, the larva feeding specially on *Primula*. Everywhere in Central Europe between 57° and 45° N., and from England to the Altai."

The remark that *festiva* frequents woods and damp places entirely confirms our own experience of the species in this country, *conflua* being essentially a heath insect, occurring most plentifully in high and exposed situations, though some of the northern forms of *festiva* are found in more or less bleak places.

I will give one more authority who entirely supports the view sought to be established in this paper, and then pass on to the insects before us. Professor Dr. Heinrich Frey, in *Die Lepidopteren der Schweiz*, published in Leipzig in 1880, gives, on p. 118, *Agrotis festiva* and *A. conflua* as separate species. He says of *festiva* that the larva feeds on *Pteris*, *Primula* and *Mespilus*, that the imago is found from the end of May to August, that it is local, and ascends to 5,500 metres. Of *conflua* he says that the larva is found on low plants, such as *Silene* [this I take to mean the moss-campion, viz., *Silene acaulis*, Linn.], *Plantago* and *Polygonum bistorta*, and that it is found "in den Berner Alpen (Rthb.), Belchen, Engelberg, Eigenthal (Wu)."

Before referring in detail to the present exhibit, I append, for the convenience of those interested in the subject, the original description of *NOCTUA SUBRUFa*, Haw. (published as a species), *Lepidoptera Britannica*, A. H. Haworth, London, 1808, p. 227: "N. (The rufous Clay) alis rufis vel rufo-purpureis strigis ordinariis stigmatibusque pallidioribus. Expansio alarum lunc. 5lin. Descriptio.—Praecedenti valde affinis, at alae in mare magis rufae, characteribus omnibus obscurioribus, stigma reniforme dorso, maculae oblongae fuscae adnatum. Femina purpurascit, stigmatibus postico superne flavicante. Caetera ut in *N. festiva*."

I will now ask you to look at the series in the two drawers before us. In Mr. Tutt's drawer, *conflua* is represented by a single row to the left, *festiva* by eight rows to the right of it. In my drawer, *festiva* is represented by five rows on the left, *conflua* by seven rows on the right. A cursory glance at these series will do more to show the different aspect of the two insects than any detailed description can convey.

The general appearance of large masses of the two insects is perhaps best seen in my own series, as the bulk is more evenly divided. The first point to catch the eye is the great difference in general colour. *Festiva*, in the mass, is of a pale brown or fawn largely suffused with a light brick red. *Conflua* is a much darker insect, in which the light brick-red is almost wanting. It may be roughly grouped into three divisions, firstly, those in which the prevailing colour is a rich chestnut brown; secondly, those which are more or less suffused with a beautiful reddish-purple; and, thirdly, those having a cold grey ground. Both species vary to such an enormous extent that any attempt to define each form would be a never-ending task, and only tend to confusion rather than to accuracy. It will be observed, however, that both species vary on somewhat parallel lines. In this connection my series shows a very important point. It will be observed that in *conflua* the vast majority show the dark quadrate and small triangular marks by the stigmata. Immediately adjacent to the *conflua* are two rows of *festiva* from Sutherlandshire, one row consisting of captured specimens, the other of bred, and in not a single instance are these dark spots seen. Shetland *conflua* appear, therefore, to be geographically separated from the southern form of *festiva* having a parallel variation, by a race in which these dark spots are wanting. Before leaving the general question of colour I would here remark that the lower wings of *conflua* are much darker than those of *festiva*. The larvæ also of the two forms are very distinct, those of *conflua* keeping much darker even when bred in the south for two generations. If, at the time when I was breeding both species, I had had the slightest notion that I should have ever been asked to write a paper on the subject I should have made careful notes and observations.

Turning from the average colours to the relative shapes and sizes of the two forms, it will be readily seen that here again we have equally well marked characters, the fore-wings of *festiva* being more broadly triangular and proportionately wider near the hind margin than in *conflua*, less acute at the apex, and more rounded on the hind margin. The average size of *conflua* is distinctly smaller than that of *festiva*.

One or other of the general characteristics just depicted may be found to break down when comparing single specimens, but I maintain that a consensus of these characteristics affords a sufficient guide to enable one without difficulty to arrive at a satisfactory determination.

It will now be seen why I consider the confusion that has arisen respecting these two forms to be due to the inclusion under the name *conflua* of certain small forms from Scotland and Teesdale. Such forms are largely represented in both Mr. Tutt's and my own series, but they will be found not to conform either in colour or shape to the Shetland specimens.

I will now direct your attention more closely to my own series,



believing that you will find any remarks on my specimens equally applicable to Mr. Tutt's series. I begin from the left. The first row represents the usual South of England forms of *festiva*, the top half being from Somerset, the bottom from Essex. Kent and Middlesex are represented at the bottom of the second row, the upper portion being a fine and varied series from the late Howard Vaughan's collection, but unfortunately without localities. For the third row I am indebted to Mr. J. Gardner, of Hartlepool. It is a bred series from Teesdale, and is the form usually distributed as *conflua*. It differs, however, in both shape and colour. Its reduced size may well be attributable to environment, as anyone acquainted with the wind-swept Fells of Teesdale would admit. But by whatever name this form may be called, none surpass it for exquisite beauty and brilliancy, and variety of coloration, the nine males at the top being well worthy of close inspection. The upper portion of the fourth row is a series of *festiva* bred by myself from specimens taken in 1894 in West Sutherland, a captured series from the same district being next it. Below are a few specimens from Central Scotland. We now come to *conflua*, row six, consisting of a large and uniform strain of the chestnut-brown variety, all bred from the pair at the bottom of row seven, which in turn were bred from Shetland ova and paired in confinement. This series is of interest, as showing how true the offspring come to the parental types; the remainder of row seven and the whole of row eight forming an excessively variable series, bred from the mixed ova that were laid in my collecting boxes whilst in Unst. The other four rows were all captured at sugar. As I have before stated, it would be useless to attempt to describe the almost endless and beautiful forms these two species exhibit; but in order to draw your attention to the most striking types of variation, not only of colour but of shape, I have placed small hands against specially noteworthy examples.

To a few of these I have already drawn attention in an article which appeared in the *F. M. M.* in January last, so need not recapitulate what I there stated.

In conclusion, I would only say that I should have been glad to have had longer time in which to look up further literature bearing on the subject. It would not have been difficult to make these notes far more complete in many important points; but it was not till our last meeting that I was asked to read a paper on the subject, and having little leisure, was somewhat dismayed to find that my paper was announced for our gathering to-day. On this ground I must ask your indulgence, and whether my conclusions be sound or no, I hope that my remarks may lead to a discussion on the subject by those better qualified than myself to form an opinion.

---

### On the Variation of *Melitaea aurinia*.

By J. W. TUTT, F.E.S.

I have recently had occasion to look up somewhat carefully the variation of *Melitaea aurinia*. When I had finished my notes on the subject I remembered Mr. Kane's article thereon (*Entom.*, xxvi.) and referred to it to see how far my conclusions agreed with his. It would appear that we agree on all broad matters of fact, although, viewing

the species from different standpoints; we disagree occasionally as to matters of detail.

The only important matter in which we disagree is as to Birchall's var. *hibernica*. I cannot help feeling very strongly that this and Mr. Kane's var. *praeclara* are identical. True, Birchall's description lacks the detail that a few of us give to our descriptions now-a-days when we are doing anything that we think important; but I have most carefully compared it with my series, and find that I should attach the name *hibernica* and *praeclara* to the same specimens in my long series, and that being so I cannot but think that they are synonymous. Descriptions of varieties (local races) must be considered "as a whole" rather than in detail. Most of my Irish specimens certainly satisfy all the conditions Birchall lays down, except as regards size and the character of the margin of the hind-wings; but the former (size) must be neglected entirely, or we should want a new name for every few specimens of *M. aurinia*, so variable is the species in this respect. Major Robertson has sent me specimens from Swansea, varying from 1½ to over 2 inches; but I consider them all Mr. Kane's var. *signifera*. As for Mr. Kane's quotation (*Entom.*, xxvi., p. 188) of the female "hind-wings as in typical forms, but ornamented neither with pale straw-coloured nor fulvous patches," I would point out that this is evidently a printer's blunder, and that something is omitted; for just before, Birchall says of the central pale straw-coloured fascia, that it "is carried on across the hind-wings." However, his description of the male is applicable enough, and clear enough for all practical purposes.

This is the only important point in which I disagree with Mr. Kane, and he can readily retort that he knows more about Irish insects than I do, which is perfectly true, and I only state my opinion based on such material as I have.

Roughly, Mr. Kane divides the British forms into three main groups:—(1) With the fulvous patches almost uniform in tint throughout the wing, the darker bases and transverse lines brownish-black=*aurinia* (the type). (2) The form in which the fulvous becomes distinctly red (of a somewhat bright tint), the central transverse band bright straw-colour, the base, transverse lines and nervures black=var. *hibernica* (*praeclara*, Kane). (3) The fulvous areas, both external and internal to the central band, constricted and suppressed by an increase of black; the central straw-coloured bands duller; the black more intense=var. *scotica*. Mr. Kane also gives intermediate forms with somewhat distinctive characters.

In working through my British series, I find the latter contains the following forms:—

(1). An unicolorous fulvous form with the transverse lines somewhat obsolete=var. *provincialis*. The best examples that I have of this form are one bred from a Penarth larva and two captured in Lincolnshire, the latter of large size.

(2). A fulvous form, the ground colour as in 1, but with well-marked transverse lines=*aurinia*. This form appears to be rare. I have a series of males from Bradfield, one or two from Sandwich, and a bred female from Penarth. It only exists as a rare aberration in the two last localities.

(3). An extreme tawny form, the ground-colour resembling that of

*M. cinxia*=*ab. brunnea*. This only occurs, so far as I know, in Britain as a very rare aberration. I have single specimens from Bradfield and Carlisle.

(4). The fulvous tint of No. 2 becomes in this redder, and the central band straw-coloured, but the red and straw-coloured areas are not restricted by the encroachment of the brownish-black ground colour=*var. signifera*. This is probably the commonest British form. My specimens came from Carlisle, Lincolnshire, Sandwich, West Malvern, Penarth, Swansea, Basingstoke, and some of my Irish and Scotch specimens fall here.

(5). The bright straw-coloured and red series of spots contrast in this form strongly with the black. Better than all description is Mr. Kane's remark: "approaches, in its richest form, the character of the continental *M. maturna*." The central area is somewhat restricted. I have specimens of this labelled "Delamere Forest(?)"; others come from Ireland. It is, I should say, a rare form, at least in England. This is in my opinion Birchall's *var. hibernica*, described as "wings above black; fore-wings ornamented with fulvous patches arranged in a series near the hind margin, and with a number of others in the middle, white or whitish straw-coloured, joined at the inner margin, forming a blotch. The hind-wings with a broad fulvous fascia along the hind margin (the fulvous marks on the narrow black outer margin of examples of the type being indistinct or obsolete in the variety); beneath pale fulvous with similar but indistinct pattern." The bracketed portion is the crux, but I find that in all the varieties occasional specimens have these marginal spots indistinct or nearly obsolete, as Birchall remarks. There can be no doubt Birchall described from very few specimens, perhaps only one picked example of each sex; but it is equally certain that he described the Irish form, and that his general description is quite applicable. Mr. Kane is dissatisfied with Mr. Birchall's description, and re-names the form "most commonly met with in Ireland" as *var. praeclara*.

(6). The fulvous and straw-coloured areas constricted, and the fulvous colour giving place somewhat to ochreous, and the straw-colour duller=*var. scotica*. This is a slightly darker form than the last, but with the exception of intensity of colour, has the same general characters. I only possess specimens from Aberdeenshire. Mr. Kane records it as occurring in Ireland.

(7). The fulvous and ochreous markings dull in colour and restricted in size; the transverse bands being rather series of spots separated by the ground-colour, the area of which is much increased. The whole insect, dull, dingy, and uniform=*var. merope*. I have a short series of a form which is indistinguishable from the continental *merope*, at least on the upper side, bred by the Rev. J. Seymour St. John, from Somersetshire (Frome) larvæ. They all appear to be a little malformed, and I have no doubt that Mr. St. John produced by some adverse treatment of the larvæ or pupæ what nature produces under the harsher natural conditions which develop *merope* in the Alps, and at high altitudes or latitudes in other Continental localities.

It would be possible perhaps to double the length of this article by entering into details of aberrational forms and a consideration of the variation of the underside. Two aberrations, however, can scarcely be passed over, one, in which the two central transverse series of pale

spots (usually divided at the upper end by a transverse black line) are united, forming a transverse series of conspicuous longitudinal streaks, and thus making a transverse band=*ab. virgata*; the other with the whole of the ordinary fulvous and red markings of the forewing dull ochreous or straw-coloured in tint=*ab. ochrea*.

We are still much lacking in knowledge of the various forms found in the Southern and Midland Counties of England, and in Scotch localities, other than Aberdeenshire. If this note be the means of eliciting information of the variation of the species in other localities it will not have been written in vain.

## VARIATION.

THE DARK VARIETY OF *SPILOSOMA MENTHASTRI*, NOT FROM ARGYLLSHIRE.—In the last number of the *Ent. Record* (*ante*. p. 75), Mr. Tutt mentions "dark varieties of *Spilosoma menthastri*" as being obtained in "Argyllshire and Elgin." I wonder if this mention of "Argyllshire" is due to my having put into an exhibition-box of the Exchange Club sundry specimens of this species from "Argyllshire and Elgin." Some confusion seems certainly to have arisen. The Argyllshire specimens are decidedly creamy; but nothing that I have taken or bred in Argyllshire can in any way compare with the dark-brown specimens which Mr. McTavish has sent out from Elgin. These seem to be quite peculiar to his district.—W. M. CHRISTY, F.E.S., Watergate, Emsworth. November 23rd, 1895.

My impression of dark Argyllshire specimens was probably formed from Mr. Christy's specimens, or from something Mr. Christy wrote. I therefore take this early opportunity to correct the error, in accordance with Mr. Christy's note. Several lepidopterists have, I know, bred the very dark forms, and I had a general impression that they were distributed from two centres, one in Morayshire, the other in Argyllshire.—J. W. TUTT. November 25th, 1895.

VARIETIES OF *HYBERNIA DEFOLIARIA*.—A QUERY.—I should be glad to know whether the banded and more unicolorous forms of *H. defoliaria* are equally distributed.—S. WALKER, York. November 16th, 1895.

*NONAGRIA ARUNDINIS AB. FRATERNA*.—From some pupæ of *Nonagria arundinis* obtained in the Broads, I bred two smoky-black females (= *ab. fraterna*, Tr.).—E. A. BOWLES, M.A., F.E.S., Myddelton House, Waltham Cross. October 7th, 1895.

*HYPISIPETES SORDIDATA AB. INFUSCATA*, STDGR., ON SALLOW.—I think I remember noticing, a few years ago, a statement that the bilberry-feeding larvæ of *H. sordidata* produced the dark brown forms of the perfect insect. This summer I bred a very dark unicolorous blackish-brown specimen from rolled-up leaves of willow, that I had collected in the spring.—W. S. RIDING, M.D., F.E.S., Buckereil Lodge, nr. Honiton, E. Devon. November 1st, 1895.

When collecting in August, 1893, in the Western Highlands with Dr. Chapman, we took a number of imagines of this species which were flying around, or driven from, the willow bushes on the east shore of Loch Gail. Many of these were exceedingly dark, almost black.—J. W. TUTT. November 30th, 1895.

*POLIA CHI* VAR. *OLIVACEA*.—I have recently been trying an experi-

ment with *Polia chi* and its var. *olivacea*. Last autumn I caught wild females of each and obtained eggs from them. These I kept quite distinct, with the object of seeing whether the var. bred true from the female variety, and whether the type bred true from the female type; in each case the male parent was unknown to me. Both batches hatched at about the same time, and the larvæ were to all appearances exactly similar. I could see no difference whatever between the two. Both lots were fed alike and under the same conditions, *viz.*, indoors in tins, on whitethorn, dock, groundsel and willow, just whichever came handiest. Both lots emerged almost together, and both produced the type and the variety, though in the case of the specimens bred from the female variety the percentage of the variety was greater than in the specimens bred from the female type. There were also two or three specimens of a yellowish ground colour, scarcely intermediate, but with a slight tendency to the variety. I did not get any eggs from a couple of the var. which I tried to pair. I have been searching again for the variety, and have got two or three females, which have laid eggs, but in no case have I been able to ascertain the male parent; but I took a typical female with the male (also typical) sitting close beside her, and she has laid eggs, so that I shall be able to see, if all goes well, whether the offspring keep to the type or otherwise.—T. MADDISON, South Bailey, Durham. *September 12th, 1895.*

## CURRENT NOTES.

The sale of Mr. W. Farren's insects assumed considerable importance, and a note or two thereon will perhaps give a clue to the public pulse on one or two points. First of all, the butterflies were practically given away, except the fine series of *Papilio machaon* (described in *Ent. Record*, vol. iv.), which produced £2 11s.; the Sesiids all fetched long prices, each lot going at about 80/-. The market value of fine *Acherontia atropos* and *Sphinx convolvuli* is about 1/3 each, whilst *Deilephila galii*, bred by Mr. Tugwell, is worth about 2/6. *Hepialus humuli* var. *hethlandica* practically has no sale value; the market is evidently glutted, whilst *Macrogaster arundinis*, in fine order, are worth but little more than 8d. each. *Nola centonalis*, on the other hand, averaged between 6/- and 7/- each. The extreme vars. of *Spilosoma lubricipeda* of the noted Lincolnshire strain, of which one has heard so much, evidently have not taken on with the public, for series containing these only were almost given away, whilst, on the other hand, those containing the Irish var. *rustica* of *S. mendica*, and Cambridge vars. of *S. lubricipeda* and *S. menthastri* fetched big prices. When two bred *C. hera*, a white male *E. russula* and 56 other specimens produce only 6/-, it may easily be assumed how generally *C. hera* must now be distributed in collections. Two pairs of *Laelia coenosa* produced 10/- and 14/- respectively, whilst two fine varieties, one of *Notodonta chaonia*, the other of *N. trimacula*, brought £2 7s. 6d. But the series of *Bryophila muralis* var. *impar* was the choicest morsel in the collection, and the lots containing four or five of these were knocked down at 22/-, 21/-, 45/-, 30/-, 18/-, 26/-, 22/-, 18/- respectively. They have of course a big historical value, as they are some of the specimens described in *The British Noctuae and their Varieties*. Bred

*Cuspidia alni* sold at about 4d. each, but *C. strigosa* raised two lots to 21/- and 20/- respectively, whilst Mr. Farren's fine Wainscots went for 21/-, 9/-, 12/-, 24/-, 22/-, 27/6, 28/-, 20/- per lot respectively. The *Nonagria newrica* were of course very fine. The rest of the Noctuids throughout averaged comparatively high prices, but four *Agrotis pyrophila*, three *A. obscura*, one *N. glareosa* var. *suffusa*, and 53 other insects for 7/-, must be looked upon as almost giving insects away. Bred *Dasycompa rubiginea*, from Devon, were not considered to be worth more than 1/- each, if of quite that value; but the *Plusias* again fetched good prices. Among the Geometers, *Phorodesma smaragdaria* fetched perhaps something under 1/- apiece, for six specimens of this species, and 40 other specimens, including two vars. of *E. punctaria*, produced only 6/-, whilst *Acidalia humiliata* and *A. contiguaria* found a sale price at about 2/- each. Taken all round the Anticleas were not fetch such good prices as the Noctuids until the Anticleas were reached, when the two lots containing the lovely forms of *A. sinuata* went at 28/- each; whilst a series of *Cidaria sagittata*, containing an aberration in which the band was nearly obsolete, went up to £3 5s.; *C. reticulata* at 10/- apiece can be considered as bought. The Crambids and Pyralides sold much below their value, and the Tortricides also; but it must be borne in mind that the specimens, with a few important exceptions, were unlabelled and their localities unknown. At the close of the sale, two pairs of *Nyssia lapponaria*, bred by Mr. Christy, were offered for sale and produced £1 15s. per pair, whilst a male and female specimen of *Chrysophanus dispar* were bought for £2 and £2 2s. respectively.

Mr. Sladen, of Dover, recounts (*E. M. M.*, Nov.) the discovery, on a grassy bank at the edge of his carriage drive, of *Sphecodes rubicundus*, a bee new to Britain. Hitherto no males of the genus *Sphecodes* had been observed in England before July or August, but Mr. Sladen found his specimens at the end of May. By a series of careful investigations Mr. Sladen was able to arrive at the conclusion that *S. rubicundus* was an inquiline of *Andrena nigroaenea* and *A. labialis*.

Mr. W. H. Nunney deals, in *Science Gossip* for November, with the interesting question of the preservation of the colours of dragon flies. He has found Barff's boro-glyceride, a well-known preparation obtainable at any chemists, the most satisfactory thing to use. After making the usual longitudinal slit in the underside of the body and withdrawing the contents as far as possible, the cavity is filled up with the boro-glyceride, care being taken not to allow the chemical to soil the outside of the body. In the case of the smaller *Agrionidae* the boro-glyceride, slightly weakened by the addition of water, is injected into the body by means of a hypodermic syringe. Mr. Nunney has also applied the method to the delicately-coloured *Ephemeridae* with great success, and suggests its use for the preservation of lepidopterous larvæ and spiders.

---

## SCIENTIFIC NOTES AND OBSERVATIONS.

GENERIC NAMES IN APATELA.—In reply to Mr. Tutt's instructive observations on this subject (*ante*, p. 58), I would say that when writing my note I had not Dr. Chapman's beautiful papers on the subject. Since then I have sent a paper to the Philosophical Society, in which

I have given the types of Dr. Chapman's genera, ascertained from a literary point of view, and, from a study of the larvæ and moths, as far as accessible, from a biological point of view. The fact is not, as Mr. Tutt states, that "literature must go." It is only through literature that we arrive at any names at all. The fact is that biologists must conform to the rules of zoological nomenclature, and are not allowed to coin new names when they discover new facts relating to insects already provided with generic and trivial appellations. The contrary view would lead us into a state of confusion, compared with which our present condition, bad as it is, would appear blessed. The genus *Apatela* contains so many types, which I think we might designate separately, that I am led to believe that Dr. Chapman's names may be preserved, which would please me not a little, although this subjective view has nothing to do with the subject. The types of Dr. Chapman's generic names are as follows: *Viminia*, type *menyanthidis*. The type cannot be *rumicis*, because this species follows *auricoma* as the type of *Pharetra*. The type of *Cuspidia* is *megacephala*. The type of *Bisulcia* is of course *ligustri*, a form I have never yet discussed. From Dr. Chapman's work it appears that restrictions of his groups or genera are possible, and certainly, so far as my observations go, a further division is practicable. Mr. Tutt says: "So far as the group has ever received a collective name, surely Acronyctidi is that name." Without going back to Hübner, if Mr. Tutt will turn over the leaves of Harris's *Eng. Insects*, 1841, and the later Flint edition, he will find the group called *Apatelidae*. The type which Harris has in his mind is *Apatela aceris*; he describes *Apatela americana*. Mr. Dyar is now studying the larvæ of the American forms, which interlace with the European, and we may soon expect some fresh information. There may be a telescoping of subgeneric names. There are many surprising things to be found out, among which, one is that the American *A. afflicta* has spatulate hairs like *alni* and its "representative" (in the moth stage) *funeralis*. *Triana* is extended in the number of species by Mr. Dyar's discoveries, much beyond the type *psi* and its American "representative" species, *occidentalis*; Mr. Dyar has five species corresponding as to larvæ. Now I do not think, in conclusion, that any of Dr. Chapman's names should replace *Apatela* or *Acronycta*; such a replacement violates the rule of priority. They may come, and I hope will come, to be used for certain minor structural types, except *Bisulcia*, which I think may be considered fairly a genus, though the moth differs very slightly from *Pharetra*, and we have five species in which the larva is green in the last stage, while our *superans* is probably congeneric. We must wait and see with patience, scientific patience, which in matters of this kind is the best state of feeling to call forth. I have written chiefly from the point of view of a nomenclator, and as I understand the matter, it is both a hopeless and an improper effort to try to overturn names in use, and the accepted action of the law of priority with regard to such names. The nomenclator is not the judge of biological work. If one biologist bases his genera on the pupa, another on the egg, another on the larva, they cannot expect, in making new titles, to have these generally acknowledged. The nomenclator takes the names as he finds them; the merit or demerit of their definition lies out of his purview. But in sincere admiration for Dr. Chapman's

work, with which I am sorry to have only just become acquainted, and after I had sent in the note printed in the November *Record*, I think I yield to no man. And I am of opinion that the value of Dr. Chapman's work is far higher, and its effect on our favourite science more enduring, than the work of a nomenclator can ever be. Such an one merely makes the tools with which the master works. *Suum cuique*.—A. RADCLIFFE GROTE, A.M. November 4th, 1895.

I can only reiterate my disagreement with Professor Grote's conclusions. So long as he uses the term "genera" in connection with the natural groups which have been found to exist in the old so-called genus *Acronycta*, I maintain that he must limit such genera to three, since Dr. Chapman has shown us that structurally there are three genera (evolutionary groups), and three only therein. Of these genera, one—*Viminia*—presents in its species, *auricoma*, *euphorbiae* (*myricae*), *menyanthidis*, *albovenosa*, *rumicis*, and *euphrasiae*—no structural differences, they "are very closely related and hardly admit of sub-division." On this quotation alone they must be restricted to one genus, and to admit more is tacitly to disagree with Dr. Chapman's conclusions, based on his excellent work, for the Dr. says in so many words that they do not admit of being broken up into a number of "genera," but are indivisibly one genus. Yet Prof. Grote and Mr. Butler find us generic names for almost every species. They say, indeed, if not in so many words,—this is our decree: That a number of old entomologists who followed the Linnæan method of giving two names to every insect, evidently without knowing anything of the biological science that it has taken their successors above a century to learn, gave a number of unmeaning names to almost every individual species, in addition to the trivial name that designated the species; that we, as synonymists, being specially entrusted with the care of handing down these gruesome remnants to posterity under the name of synonymy, care nothing (and know nothing) of the biological studies of your leading men, and their conclusions are nothing to us, but we will settle the names their final groupings shall bear. Our business is with names and here is our command. We find five of your six species have had separate generic names given them, here they are:—

*Viminia menyanthidis*  
*Pharetra auricoma*  
*Arctomyscis euphrasiae*  
*Arsilonche albovenosa*  
*Lepito rumicis*

Take them, use them, and don't ask any questions about them. By-the-bye, we have not found one for *euphorbiae* (*myricae*) yet, but we hope to do so shortly; until we do you can tack it on to one of the others (since they are all structurally identical it don't matter which, in fact, you had better ask your biologist which one he would like it tacked on to). We grant him this temporary privilege as a reward for his labour.

To all of which the logical Britisher replies:—It is necessary that the names of things should be fixed and definite, and hence "trivial" names, since they define "things," should be subject to your rigid laws; but "generic" names representing as they do "groupings," which are necessarily at present in a state of flux, are continually in a



state of change, and therefore your rigid application of rules—largely right may be as to trivial appellations—is utterly illogical, unsound, unnecessary and absurd when applied to names of genera about which no one has yet any definite ideas. You cannot measure an indefinite idea with a foot rule, nor can you keep a fluctuating quantity always within the same precise limits, nor is there any logic in transferring the same title successively to a dozen different indefinite ideas. There can be no doubt that whilst a “trivial” name, representing as it does more or less a definite thing, should be retained at all hazards, yet a generic name, representing something necessarily indefinite and subject to change, should be, nay must be, allowed to lapse, when its uselessness and misleading character are shown by the light of our recent discoveries. Trivial names represent things, these we can leave to the synonymist. Genera represents relationships, these must be left to the biologist. Only the latter knows what names will best illustrate and convey his meaning to a general public, who must clinch his argument quickly and retain his “names” without difficulty. He doesn’t want any resurrecting to help him do this. All of which is of course very rude to the synonymy man, but it is what the average Britisher feels.

Another section of the British public says: Your synonymist says it is no part of my duty to test the correctness of biological conclusions; it is only my work to find the names for the new groupings set up by the biologist. If this be so, why don’t you synonymy men find *three* names for Dr. Chapman’s three groups. Why don’t you settle at once that *Pharetra* is older than *Arctomyces*, or *vice versa*, and include the *Viminia* species therein, thus:—

*Pharetra*, Hb. (*auricoma*, *euphorbiae*, *menyanthidis*, *albovenosa*, *rumicis*, *euphrasiae*).

Then you can insist that *Apatela* is older than all the other appellations in *Cuspidia*, and include the Cuspidian species, thus:—

*Apatela*, Hb. (*aceris*, *psi*, *tridens*, *megacephala*, *strigosa*, *alni*).

*Bisulcia*, having no equivalent, must stand thus:—

*Bisulcia*, Chpmn. (*ligustri*).

This latter section I personally disagree with, believing the principle the individuals comprising it advocate to be wrong; but at least, I understand their position.—J. W. TUTT. November 9th, 1895.

IMPUDENCE OF WASPS.—I have no doubt numbers of entomologists have noticed wasps attack insects on setting boards, especially those taken at sugar, but has anyone had an experience like the following? After setting a number of *Xanthia citrargo* this autumn, I left the setting board on my table for a short time; on returning I found a wasp busy pulling at one of the bodies, in fact, in the short space of four or five minutes, they had totally destroyed several specimens, detaching the abdomens and carrying them away. I re-commenced setting other specimens, and on placing two or three more on the table in readiness for pinning out, down came Mr. Wasp as bold as Hector, and like a little terrier laid hold of one which he spoiled before I could prevent him. Shortly after, a wasp took a *X. citrargo* away while my attention was withdrawn for a minute or so. Had the colour or the taste of *X. citrargo* (they were bred specimens) anything to do with this (to me) unaccountable voraciousness? I had at the time several setting boards filled with other freshly-set species, both bred and taken at sugar, standing in my setting room, but these were

not interfered with. I may say that we have had very few wasps in this locality this autumn.—J. MASON, Clevedon Court Lodge. *October 21st, 1895.*

**PARTIAL DOUBLE-BROODEDNESS OF PERICALLIA SYRINGARIA.**—From a female *P. syringaria* I obtained eggs on June 25th. From these five imagines have already emerged, *viz.*, three females and two males; the rest of the brood are in the larval stage and are evidently about to hibernate.—(MAJOR) R. B. ROBERTSON, Coxhorne, near Cheltenham. *October 25th, 1895.*

**HYBERNATION OF THE FEMALE MOTH.**—In reply to the statement of the cause of hibernation in the female only (p. 56), I would suggest that it may be related to the habits of egg-laying. The male is shorter-lived than the female, and dies often soon after copulation. If this latter act took place late in the year, the fecund female might hibernate during interrupted oviposition. It appears that ♀ *Acherontia atropos* migrate only, the males perishing after copulation. The phenomena of prolonged life in the female is undoubtedly connected with the preservation of the species. The hawk moths, which deposit their eggs singly are longer lived than the spinning moths, which deposit theirs in clusters. Case-bearing moths, in which the female never leaves the sack, the eggs being laid in a mass, are short-lived. I am not acquainted with the facts as to the habit of egg-laying in *Dasypolia templi*, but if the female generally passed the winter, the male perishing in the autumn, it seems probable that the egg is not laid until spring, or that the process of oviposition is arrested by the temperature before it is completed.—A. RADCLIFFE GROTE, A.M.

**WING-CLOTHING IN THE LEPIDOPTERA.**—Prof. Vernon L. Kellogg finds on the wings of the *HEPIALIDS* and *MICROPTERYGIDES* a covering of fine hairs, and is convinced that the presence of this clothing of minute hairs on the wing membranes of the *JUGATAE* is a subordinal character. As compared with the *Trichoptera*, the wing clothing of these lowest moths is more specialized by the degradation of the fine hairs, and by a specialization by addition in the highly developed scales characteristic of the entire *Lepidoptera*. In the *FRENATAE*—butterflies and moths (except *Hepialus* and *Micropteryx*)—the fine hairs are wanting. These studies are in so far confirmatory of Dr. Chapman's views relating to *Hepialus*, regarded as the end development of a long series, since Prof. Kellogg finds the specialization of the scales (as opposed to the fine hairs) of the wing in *Hepialus* as confirming the supposition that this genus is the existing tip of a phylogenetic branch whose lower members have disappeared.—A. RADCLIFFE GROTE, A.M.

**SOUNDS EMITTED BY LEPIDOPTERA.**—The object of the noises made by many butterflies and moths has not been speculated upon to my knowledge. It would seem, however, possible that they are accessory to mimicry, since several of the forms uttering them appear to possess protective colour and markings. Professor Dr. Pabst, of Chemnitz, has made mention of cases of sound-making hitherto published, and they may be briefly detailed here. *Trochilium apiforme*, which imitates a hornet in form and colour, apes it further by its slow flight and emits a buzzing noise similar to, if feebler, than that common to many bees and wasps. Dr. Pabst believes this peculiar buzzing to be independent of any noise due to the mechanical action of the wings in flight, as it is only observed in the case of *T. apiforme*. The female

*Arctica pudica* is stated by Geiger to produce a dry, whirring sound, comparable to that made by grasshoppers. Ribbe states that an Indian Agrotid, *Glottula radians*, has been noticed to squeak. The American butterfly *Ageronia feronia*, when commencing to fly, makes a clattering noise like castanets, which may be expressed by the syllables "tetteret tet tet." It is thought that this noise is produced by the rubbing of certain distended veins of the primaries over the secondary wings. In the genus *Hypsa* both sexes have on the under-side of the fore-wings a thorn, while the hind-wings show near the costa a space covered with hard and furrowed scales. It seems that the creaking noise here noticed is made by the rubbing of the thorn over this specialised field of the secondaries; while the volume of tone seems in this instance possibly increased, by a blister-like enlargement of the epidermis of the fore-wing in the vicinity of the thorn. The males of the Noctuid *Thecophora fovea* which have a blister-like depression of the secondaries make, in flying, a shrill noise. It seems possible that the various peculiar modifications of the male wings, which have been noticed in exotic AGROTIDES, may be used in the production of sounds. The question as to whether these insect-sounds are audible, as we hear them, to other insects, is an unsolved problem. But for purposes of protection it would be sufficient, in some instances, if they were audible to the vertebrate ear, and heightened the deception in form and colour impressed upon the vertebrate eye.—A. RADCLIFFE GROTE, A.M.

ON THE DORSAL SPINES OF THE LARVÆ OF EUVANESSA ANTIOPA.—In *Larvæ of British Butterflies*, vol. i., p. 53, Mr. Buckler says of the spines of the larvæ of *Vanessa antiopa*:—"On the third and fourth segments there are four rows of spines (the second has none), but on all the other segments there are seven rows, that is, seven spines are planted round the middle of each segment, viz., a dorsal, which is the shortest and a little in advance of the others, subdorsal, lateral and subspiracular." Buckler counts the head as segment 1, the three thoracic segments as segments 2, 3 and 4; so that the first, second and third abdominal segments become segments 5, 6, 7 and so on. Now the above statement says that the prothoracic segment has no spines, the meso- and meta-thoracic segments two pairs each, the rest (1st, 2nd, 3rd, 4th, and other abdominal segments) "7 spines" each, "viz., a dorsal, a pair each of subdorsal, lateral and subspiracular." On p. 54 the same author writes: "The dorsal row of shorter spines commences on the seventh segment." Buckler has already stated in the first quotation that the 1st and 2nd abdominal segments have a dorsal spine; now in the latter quotation (a part of the same description) he denies that this is so. The latter is evidently correct, and bears out Scudder's generic definition of *Euvanessa*, which reads as follows: "First and second abdominal segments with no spine on middle line of back." I call attention to this because of its misleading character, and because of the important bearing this different structure of the caterpillar has on the generic divisions of the very different species we include under the generic title *Vanessa*.—J. W. TUTT.

## NOTES ON COLLECTING, Etc.

### Some Stray Entomological Notes of 1895.

By W. S. RIDING, M.D., F.E.S.

The protracted frost during the early months of the year caused a scarcity of most hybernating larvæ. Those of *Tryphaena orbona* were an exception, and could have been taken in large numbers by shaking hawthorns and elms in the hedges. Some which I bred, produced many varieties—several dark ones marbled and shaded with grays and browns like Scotch forms, besides the red ochreous var. and the pale one with reddish-brown stigmata. The perfect insect, oddly enough, rarely turned up at sugar. I did not come across half a dozen, whilst *T. pronuba*, the larvæ of which could only be found here and there, was a perfect pest at sweets later on, and variable as usual. We searched in vain for the pale larvæ of *Boarmia repandata*, as two years ago I bred two var. *conversaria* from some feeding on hawthorn, neither was the perfect insect to be found in the summer. In May and early June there was no difficulty in choosing the pick of the larvæ falling to the beating stick, though usually much selection is needed if we would not overstock our cages. To find a larva on elm (except a few of *Calymnia trapezina*) was a hopeless task and provoking, as I hoped to breed a large number of *C. affinis*, and some *C. diffinis*, thinking I might find amongst them *C. pyralina*. *Eupithecia rectangulata* larvæ were rather plentiful in apple orchards, a practised eye soon resting on petals of blossom spun together where the variable larva was pretty sure to be found snugly ensconced, though weevil grubs mostly fall to the lot of the novice till he is able to recognise their less tidy work.

Sugar was rather more productive than usual in early June, but the best insects were *Aplecta adrena*, *Grammesia trigrammica* var. *bilinea*, and some rather dark forms of *Xylophasia hepatica*. Later on, it failed to attract, save *T. pronuba*, and in July, searching night after night, I could only get together 15 *C. pyralina*. The manuals give August as the "time of appearance" for the latter, but this does not accord with my experience. I take it the first week in July and throughout the month, the insect getting more or less worn towards the end. Once, in 1891, two fresh specimens were taken on August 2nd, but none after that date, though well searched for. I find it here only in apple orchards, and have a strong suspicion that it may turn out to be an apple-feeder, but unfortunately we cannot very well beat our neighbour's future cider crop, and so must try and solve the question some other way. A few elms may, it is true, be scattered here and there on the outskirts, but the insects do not seem to frequent the sugared trees on the outside more than those in the centre of the orchard, and they are also the very first insects to rush to the sweets at early dusk, before a Noctuid can be seen flying. During the same month I netted, either in damp lanes or round the sugar, or boxed off it, some 30 or more of *Hyphenodes albistrigalis*, but, as usual, about one in ten only were fine specimens. In the lanes the moth flies low, and drops into the grass or thick herbage, wriggling about in it, and so loses its scales. Can no one give a clue to its food plant? I hope to have a good search for it next year, as, being tolerably abundant in a few localities, it seems strange that entomologists, both in this country and

abroad, should still be in the dark as to its life-history. Flowers attracted a fair number of insects for these parts; red valerian seems, after all, the greatest favourite, and *Cucullia umbratica*, *Plusia iota*, *P. chrysitis*, *P. pulchrina*, *Habrostola tripartita*, *H. triplasia*, and others kept hovering over it as soon as dusk set in. Lavender, Marvel of Peru, and Lobel's catchfly, which I planted as allurements, somewhat disappointed me. One night, after a dispiriting search at heather, I came on a patch of wood sage, on which moths were simply revelling. In a few minutes I had boxed some two dozen, amongst which were six *Noctua stigmatica* and *Gnophos obscuraria*; it being August, the former, unfortunately, were not in cabinet condition, but I got some three dozen eggs from them which duly hatched, and the young larvæ are now feeding well on carrot and chickweed. I think *N. stigmatica* is not included in Mr. Reading's list as a Devonshire insect. To search the heather for a couple of hours night after night in August and September (after a walk of three miles more or less up-hill, and a probable trudge homewards with all but empty boxes) wanted a more elastic frame than mine; but, thanks to my son, Mr. Edward Riding, we filled up our rather long series of *Agrotis agathina* with an addition of ten. Two were fine specimens of var. *rosea*, and the rest, as usual, more or less rosy—for the most part less. He also took a few rosy *Noctua glareosa*, some pink all over, others in part, and two or three with a purplish tinge. These, with eight *N. castanea* var. *neglecta* (all gray, except one, which was faintly purplish), two *Luperina cespitis*, a few *Characæ graminis* (this insect occurs sparingly here, never in detrimental abundance as in Scotland), *L. testacea*, *Cidaria testata*, and a few plumes (*P. monodactylus*) sum up our captures, and equally well all the visitors seen on the blossoms, if we add the rejected *N. xanthographa*. *Tapinostola fulva*, as usual, was abundant after its first flight, at rest on rushes near, both the type and several of its different varieties. On other high grounds we took a sprinkling of *Stilbia anomala*, some in perfect condition, as late as the third week in August, which is very unusual here. Several ♀'s yielded only a few eggs (the insect apparently never lays many), and these have recently hatched and are slowly feeding up on *Poa annua*. A small patch of *Nicotiana affinis* in our garden attracted *Sphinx convolvuli*. My son took the first on August 24th, and I took the last of four netted on September 25th. Geometers have been very scarce, many, usually fairly abundant, not even putting in an appearance, such as *Pericallia syringaria* and *Nuneria pulveraria*. Autumn beating was so unsuccessful in September that I gave it up, and I hear a similar report from many localities, save from beyond the Tweed. Our Scotch friends, as usual, seem to have had the best time.

It is generally stated that Lepidoptera always lay their eggs on the food plant of the larva, or scatter them about it. Such a statement requires modification, as exceptions seem far from uncommon. I have come across several this season. About midsummer, whilst searching larch trunks amidst the heather for *Tephrosia biundularia*, I noticed on a pine trunk a few yards off a batch of eggs, which on closer inspection I found to be those of a *Bombyx*, presumably, I thought, looking to the situation, *B. rubi*, and such they proved to be when the larvæ hatched out. The eggs were deposited conspicuously on the trunk at a height of nearly six feet. Again, one day when on the prow in the garden,

I saw a whitish patch glueing together two of the linear leaves of a Weymouth pine, and pulling the branch down, found that the couple were girdled round with a deposit of the eggs of some Noctuid. They were dirty yellowish-white (changing afterwards to reddish-brown), in form two-thirds of a hemisphere, and with about 50 ribs, and laid regularly but obliquely round the leaves in rows of 10, and in between 70 and 80 rows, so that at the lowest computation there must have been over 700 eggs. The leaves on which they were laid were near the extremity of a branch, and more than six feet from the ground. Again, I found a similar deposit on a boundary tennis net, at about the same height, and two years ago I had seen similar eggs on the net in two or three places, but forgot to collect them before hatching. On both pine and net they were difficult to recognise, looking at first sight like the stain of bird's droppings. I suspected the eggs to be those of *T. orbona*, but they have turned out to be *T. pronuba*. Can they have been laid away from their food-plants as ground feeders, so that a larger proportion of the 700 might have a better chance in the struggle for existence through being scattered as young larvæ, and also avoid a wholesale slaughtering in the egg state by ants or spiders, or some of their natural enemies? It looks like a protective arrangement, and probably there was a similar instinct inducing *B. rubi* to desert the heather when depositing her ova.—Buckerell. October 15th, 1895.

### Coleoptera at Ipswich in 1895.

By CLAUDE MORLEY, F.E.S.

Many additional species have this year turned up to my previous records of Suffolk COLEOPTERA [*Ent. Rec.*, vol. v., p. 52, and vol. vi., p. 114] which may be of interest. I will not, as before, give a full list of the species taken, but merely enumerate the additions, making at the same time one or two notes on the better species of last year, and 1893.

*Cychrus rostratus*, never before seen alive, was on sugar with a large slug between its mandibles, on August 10th, whether it was attracted by the sweets or the mollusc I cannot say. Several *Amara lunicollis* were found in moss in the early spring, and with working should turn up commonly. *Pristonychus subcyaneus* appears to have quite deserted its old haunts, in which it used to be abundant on sugar. I omitted to record last year a couple of *Patrobis excavatus*, from under a log, on 25th May. *Metabletus obscuroguttatus*, the scarcest of the genus hereabouts, was taken from aquatic plants on March 22nd. HYDRADEPHAGA and HYDROPHILIDÆ have been worked with considerable success, and the following species added: *Haliphus cinereus*, *Hydroporus erythrocephalus*, *H. melanocephalus*, *H. pictus*, *H. lituratus*, and *H. nigrita*. *Hydroporus halensis*, which turned up not rarely last year, has not put in a single type this, nor have I seen *Coelambus parallelogrammus*. Of the HYDROPHILIDÆ, all the *Anacaenæ* swarmed in company with *Laccobius alutaceus*, *Helophorus affinis*, *H. brevipalpis*, and *Hydrochus angustatus*. I added *Philydrus suturalis*, *P. nigricans*, *P. testaceus* and *P. ovalis*, *Berosus luridus*, *Limnebius papposus* and *L. truncatellus*, *Helophorus aeneipennis*, *Ochthebius pygmaeus*, and *Hydraena testacea* ;

and of the SPHAERIDIIDÆ: *Sphaeridium marginatum*, *Cercyon analis*, *C. haemorrhoidalis*, *C. littoralis* (abundant), *C. nigriceps*, and *C. unipunctatus*.

To the BRACHELYTRA I have paid especial attention, and consequently the species have augmented considerably. Those not seen before comprise: *Aleochara lata* from a rat, and *A. fungivora* from fungi, *Oxyptoda opaca* on the water of a sheep's trough. *Thiasophila angulata* were somewhat common in nests of *Formica rufa* towards the end of April, and about the same time *Atemeles emarginatus* was in moss (among swarms of *Myrmica scabrinodis*). Of the Homalotæ *Callicerus obscurus* was swept, *Thamiaria cinnamomea* and *Homalota succicola* taken from *Cossus* borings, *H. atramentaria*, *H. parva*, and *H. circellaris* from moss, *H. elongatula*, *H. graminicola*, *H. gregaria*, *H. longicornis*, and *H. triangulum*, flying in the sunshine, *H. fungicola*, *H. vicina*, *H. vestita*, *H. aterrima*, and *H. gagatina* swept, *H. melanaria* I took from fungi. A small colony of *Xenusa sulcata* was found under a piece of broken china on April 1st. *Falagria sulcata* was swept in March, and several species of *Gyrophæna*, including *G. congrua* and *G. nana* were common in fungi. *Hygronoma dimidiata* and *Mycetoporus splendens* occurred on reeds during April, and *Hypocypus longicornis* was somewhat common in moss, together with *Leptusa ruficollis* in the early spring. *Conosoma pubescens* occurred both in the spring and autumn, under logs, &c. *Leistotrophus murinus* was taken from a dead hedgehog in the woods (which also yielded *Pulex erinacei*). *Ocypus brunnipes* turned up under bark on an old birch stump in February, and *O. similis* under a log in April.

Many species of *Philonthus* have been added: *P. umbratilis* from a dead crow on 20th April, *P. discoideus* from water of horse trough on 10th May, *P. laminatus* from moss in early spring. *P. lucens*, I might also mention, as having been taken from moss in November, 1894. *P. sordidus* and *P. trossulus* have both been common; *P. intermedius* was in dung in September, and a couple of *Cafius xantholoma* turned up in a dead dog, washed up by the tide in April. *Actobius procerulus*, in April and May, on the water of horse troughs, and *A. signaticornis* swept from reeds in August. *Leptacinus parumpunctatus* and *L. linearis*, both new to me, were on water during May. *Baptolinus alternans* did not put in an appearance until July. *Stenus angustatus* and *Paederus littoralis* were both, of course, taken by sweeping. The genus *Stenus* has also "come on" nicely, the new species being *S. ater*, *S. bifoveolatus*, *S. buphthalmus*, *S. circularis*, *S. erichsoni*, *S. impressus*, *S. latifrons*, *S. nitidiusculus*, *S. pallipes*, *S. pallitarsis*, *S. pusillus*, and *S. rusticus*, nearly all taken either by sweeping rushes bordering streams, or under the bark of adjacent willows in the winter; *S. impressus*, however, appears pretty well ubiquitous, and *S. nitidiusculus* is more often taken running on the sides of ponds. *Oxypterus rufus* was common in fungi. Perhaps the best BRACHELYTRON (excepting *Gymnusa brevicollis* from the New Forest). I have taken this year is *Bledius taurus*, of which two ♀'s came to electric light on the 22nd August. *Oxytelus nitidulus* from my garden, *O. sculptus*, common in dung, and a couple of *O. tetracarinatus* from water were added, together with *Haploderus coelatus* commonly, *Trogophloeas bilineatus* from water, *Olophrum piceum* from beneath logs, &c., and *Homalium caesum*, *H. fossulatum*, and *H. pusillum*, which complete the list.

The CLAVICORNIA shows some signs of neglect. *Tychus niger* was swept on the river bank, *Choleva morio* and *C. relax* were in dead birds, *Onthophilus striatus* and *Scaphidium 4-maculatum* under logs, *Scaphisoma agaricina* in fungi, *Cyrtotriplax bipustulata* in moss, *Phalacrus caricis* swept from reeds, *Hippodamia 13-punctata*, *Scymnus frontalis*, *Olibrus liquidus*, *Cercus bipustulatus*, and *Brachypterus urticae* swept. *Epurea pusilla* was taken commonly from chips of felled pines. *Nitidula rufipes* from a dead dog. *Meligethes difficilis*, *M. brunnicornis*, and *M. memnonius* from flowers, especially those of *Ranunculus ficaria* and bramble. *Cryptarcha strigata* from *Cossus* infected oak. *Cerylon histeroideus* under bark on birch stumps, *Psammoechus bipunctatus* swept from refuse of aquatic and other plants in spring and autumn. Comparatively few of the *Cryptophagidae* and *Lathridiidae* were taken: *Monotoma picipes*, *Lathridius lardarius*, *L. minutus*, *L. nodifer* and *L. transversus*, *Corticaria elongata* and *C. gibbosa*, *Telmatoophilus caricis*, *Cryptophagus acutangulus*, *C. pilosus*, *C. lycoperdi* and *C. scanicus*, *Myrmecoxenus vaporariorum*, *Atomaria mesomelas*, *A. nana* and *A. ruficornis*, all swept, except *C. scanicus*, which swarmed in a piece of stale, damp bread. *Mycetophagus piceus* from fungi, *Simplocaria semistriata*, and *Elmis aeneus* are nearly all that have been added to the CLAVICORNIA.

(To be continued.)

ACHERONTIA ATROPOS AT CLEVEDON.—A fine specimen of *A. atropos* was taken at rest near the gas-works in Clevedon about a week since. I suppose the recent hot weather induced the insect to emerge.—J. MASON, Clevedon Court Lodge. October 18th, 1895.

AN AUTUMNAL EMERGENCE OF NOCTUA CONFLUA.—I have just bred to-day a lovely specimen of *Noctua conflua*, one of a batch of ova sent to me from Shetland, in July last.—T. MADDISON, South Bailey, Durham. November 11th, 1895.

EARLY APPEARANCE OF POECILOCAMPA POPULI.—I have recently taken a few insects from the lamps, the most important being a male *Poecillocampa populi*, on October 18th. Is not this very early? I took the species last winter in January.—E. R. BUSH, 71, Strathmore Street, Perth, N.B.

SPHINX CONVOLVULI AT CLEVEDON.—*S. convolvuli* has not been by any means plentiful here this autumn. In 1887 I took a specimen as early as August 18th; this year the first appearance of the species was on the evening of August 28th. The specimen seen on that evening I did not capture—was too nervous I suppose. I had been on the watch for the insect for a fortnight before, having a splendid bed of the tobacco plant in flower, but did not see a specimen until the 28th. The next evening I took two specimens; they were not so fine as usual considering the earliness of the season. After this the weather was unfavourable, and it was a fortnight before I saw any more. On the evening of September 11th I took one specimen, and saw, but did not capture, another; and two nights after captured a fourth. The same evening we experienced a very heavy thunderstorm. After this I saw no more until September 20th, when I saw two, but missed both. The following night I took another—my last capture; about a week after, however, I saw another but failed to capture it, and did not notice any more after that date (September 30th). The latest date at which I have captured *S. convolvuli* was in 1886, when I took it at a



bed of geraniums on October 11th. All the five specimens taken this year were females, and none of them were in fine condition.—J. MASON, Clevedon Court Lodge. November 14th, 1895.

*DASYCAMPA RUBIGINEA* AT CLEVEDON.—I have been taking odd specimens of this species (seven up to date) now and then since the second week in October. The sharp frosts that we had in October seemed to affect insects very much, as they have been very scarce since. I took another specimen last night, and should the weather keep open may no doubt take more. I shall do my best to complete my series this year, but it is a trying job for one's patience; night after night one fails; then another specimen turns up, and one goes at it again with renewed vigour.—IBID.

*XYLINA SEMIBRUNNEA* AT CLEVEDON.—I have only taken one *X. semibrunnea* this autumn, early in September, and have seen no others. I fancy this must be one of our rarest insects, as few collectors seem to have a complete series. Both this species and *X. socia* have been much less common in this locality since the dry summer of 1888.—IBID.

MICRO-COLLECTING IN 1895.—This has been one of the worst seasons for Micros that I have known. The only good species that I have found abundant was *Sciaphila sinuana* in the larval stage. Several local species that I look upon as certainties, e.g., *Laverna raschkiella*, *Asychna terminella* and *Scoparia basistrigalis*, have been hardly obtainable, and a long hunt for *Tischeria angusticoella* produced three dead mines. Certainly my time for day work has been limited, but the results are very meagre.—H. H. CORBETT, M.R.C.S., 19, Hallgate, Doncaster. October 30th, 1895.

In Unst, I found that *Aphelia osseana* (*pratana*) was much scarcer this year than when I was there in 1889, so also was *Pamplusia monticolana*. In 1889 these species could be bagged in hundreds, whilst this year we had to search for single specimens. Messrs. Reid, Bright and myself worked hard for Micros, as we hoped to find something good, but without much success, either in species or numbers. The only species that could be taken in numbers was *Glyphipteryx thrasonella*, which simply swarmed in damp meadows, and the local *Sciaphila colquhounana*, a fair number of which could be obtained by searching the rocks, which are of much the same general tone as the insect. I should say that, upon the whole, Micros were scarce this year, compared with the year 1889.—J. J. F. X. KING, F.E.S., 207, Sauchiehall Street, Glasgow. November 5th, 1895.

UNUSUAL APPEARANCES IN THE ABERDEEN DISTRICT.—I should like to record the capture of a few species of moths which have not, I think, been taken here for many years. The first of these is *Euchelia iacobaeae*, taken near Aberdeen, several specimens of *Sphinx convolvuli* taken during the autumn in the neighbourhood, whilst on September 17th I took sixteen specimens of *Dichonia aprilina*, twenty *Miselia oryacanthae*, and one specimen of *Hadena protea*.—F. W. BUCHAN, Backhill, Rubislaw, Aberdeen.

UNUSUAL APPEARANCES AT MONTROSE, N.B.—I am much interested in Mr. Buchan's notes, because it is the first year I have taken *Hadena protea*, *Dichonia aprilina* and *Euchelia iacobaeae*. One *D. aprilina* was taken here three years ago, but this year they were most plentiful. I have also had two *Sphinx convolvuli* brought to me.—MONTAGU GUNNING, M.D., The Mall, Montrose, N.B. November 7th, 1895.

**STERRHA SACRARIA AND DASYCAMPA RUBIGINEA IN THE ISLE OF PURBECK.**—On Saturday afternoon, September 7th, I had a great slice of luck, and took a fine male specimen of *Sterrha sacraria* in a stubble-field near here. I was out partridge shooting with my brother at the time, and suddenly noticed the moth flit up from under my feet; it soon settled again, however, and after one unsuccessful attempt I succeeded in securing it in a glass-bottomed box, which was the only available weapon of offence that I had with me. Repeated efforts to meet with other specimens, both then and on subsequent occasions, proved in vain. The only example hitherto recorded from Dorset was taken by Mr. E. R. Dale, as long ago as August 31st, 1867. Of the *Macros*, my next best capture during the past season was a single female example of *Dasycampa rubiginea*, taken at ivy bloom; on October 16th; this was the only reward worth mentioning for pretty constant work at ivy and sugar during several weeks.—EUSTACE R. BANKES, M.A., F.E.S., The Rectory, Corfe Castle. *November 16th, 1895.*

**ABUNDANCE OF OPORABIA DILUTATA.**—During the last few weeks *Oporabia dilutata* has been plentiful all round London, a large proportion being very dark and unicolorous, without markings.—H. J. TURNER, F.E.S., 13, Drakefield Road, Hatcham, S.E. *November 21st, 1895.*

**XANTHIA OCELLARIS NEAR RICHMOND, SURREY.**—I captured one specimen of this insect near Richmond, on September 15th, and another on September 21st. The two specimens differ in appearance, but the light spot on the reniform and the white wing-rays show clearly in both. The lighter of the two has no conspicuously dark markings, and is, presumably, of an extreme type, the dark one, I suppose, of the normal.—W. A. COPE, 30, Crescent Road, Bromley, Kent. *November 22nd, 1895.*

**NONAGRIA CANNAE ABUNDANT.**—A few days in the Norfolk Broad district. were the most successful I have experienced this year. *Nonagria cannae* was abundant in the pupal stage, but I only managed to successfully pull through about 20 per cent. of the pupæ obtained. The pupæ were in some cases drowned, for the July rains had caused the water to rise over the thin place in the *Typha* stem, left for emergence.—E. A. BOWLES, M.A., F.E.S., Myddelton House, Waltham Cross. *October 7th, 1895.*

**ABUNDANCE OF ASTEROSCOPIUS SPHINX AT LIGHT.**—*Asteroscopus sphinx* put in an appearance in the trap for the first time on November 6th, being about a fortnight later than usual, owing, I suppose, to the cold spell at the end of October, but now it is making up for lost time, and yesterday morning I found 51 males in my traps, the bulk in good condition. On the 8th inst., I got one with the right antenna, female, and the left, male. I cannot say whether the difference in sex extends any further, there being, so far as I know, no other outward distinction, though the female is usually larger. The specimen is of medium size, and one of the yellow or cream-coloured aberrations.—E. F. STUDD, M.A., B.C.L., F.E.S., Oxtou. *November 15th, 1895.*

**SUGARING IN SHETLAND.**—As far as my own collecting experience is concerned, I found sugaring to be very unequal whilst I was in Shetland. On some nights the posts were almost covered with Noctuids, whilst on other evenings, apparently as favourable, scarcely

a Noctuid moth was to be seen. In a note from Mr. Salvage the other day, he remarks that sugar was a complete failure during his collecting tour in Ireland.—J. J. F. X. KING, F.E.S. 207, Sauchiehall Street, Glasgow. *October 30th, 1895.*

### Notes of the Season.

CASTLE MORETON (TEWKESBURY).—This has been a very good year for insects in this district. Sugar proved attractive throughout June, and up to July 27th, when I left home. During the latter part of August but few things came, but with the advent of September, insects again came in numbers, and this was the more striking, as, with the exception of two or three nights, the evenings were not favourable for sugaring. Light has been more or less productive throughout the season. According to my experience, this season has been remarkable for the abundance of certain species, and the almost entire absence of other species. Among the species more than usually common I may mention:—*Grammesia trigrammica* var. *bilinea*, *Caradrina alsines*, *C. taraxaci*, *Tryphaena orbona*, *Anchocelis pistacina*, *A. lunosa*, *Xanthia gilvago*, *Calymnia affinis*, *Epunda lutulenta*, *Amphipyra pyramidea*, and *A. tragopogonis*. *E. lutulenta* and *A. lunosa* have been far more abundant than I have ever known them; the latter has never been a common species here before, and I do not think that I have ever taken two dozen in any one year. This year, however, I could have taken a hundred on one night, and there was great variety, the colour ranging from red and yellow to pale and dark brown. *Leucophasia sinapis*, *Asthena candidata*, *Acidalia remutaria*, *A. imitaria*, *A. aversata*, *Timandra amatoria*, *Minoa murinata*, *Eupithecia exigua*, *E. rectangulata* and *Cidaria pyraliata* were all fairly common. On the other hand, *Lycaena argiolus*, *Ino geryon*, *Leucania conigera*, *Cerigo matura*, *Agrotis obscura*, *A. corticea* and *Calymnia diffinis* were scarcer than they are some years. *Ino geryon* seemed to be almost confined to one small spot. The insects, however, most conspicuous by their absence were *Hadena dissimilis*, *Lithosia griseola*, and *Noctua festiva*, species that are sometimes common here; of the two former I saw absolutely none, and of the latter only three or four specimens. The above may give a general idea of what the season has been here; many species appeared sparingly, besides those enumerated above, such as *Acidalia trigeminata*, *Hadena genistae*, etc., but these call for no special remark.—(REV.) E. C. DOBRÉE FOX, M.A., Castle Moreton, Tewkesbury. *September 26th, 1895.*

GRANGE-OVER-SANDS.—This has undoubtedly been an exceptional year here, certainly the best since the Jubilee year. Sugar has been most prolific, and of some species, such as *Epunda nigra* and *Mamestra furva*, I have taken more specimens this year than during the preceding seven years added together. I am unable to call to mind any particular species, usually taken here, which has been scarce, and I should say quite 90 % have been abundant, or at any rate very much more common than usual. This also applies to the Isle of Man (a favourite ground of mine), although the rarities, such as *Polia xanthomista* and *Dianthoecia caesia* are becoming scarcer every year, owing to a large portion of the workable ground having been destroyed through the formation of a drive.—G. A. BOOTH, F.E.S., Grange-over-Sands. *October 7th, 1895.*

GLASGOW.—It is exactly ten years since I started collecting insects, and, without exception, the present year has been the most productive in my experience. Since the beginning of May up to the present date my boards have been always well filled. Sugar has always taken well, especially in September, when I spent a fortnight at the head of Loch Lomond. *Orthosia macilenta*, *Mellinia circellaris*, *Epunda nigra*, *Hadena protea*, and *Calocampa vetusta* were all very common. *Noctua glareosa*, *Orthosia lota*, *Orrhodia vaccinii*, *Xanthia fulvago* and *X. flavago* came freely. *Hydroecia nictitans* was very common on the flowers of scabious; whilst of insects that came to sugar in smaller numbers were *Hydroecia micacea*, *Agrotis ypsilon* (*suffusa*), *Noctua dahlia*, *Anchocelis helvola* (*rufina*), *Calymnia trapezina*, *Miselia oxyacanthæ*, *Dichonia aprilina*, *Brotolomia meticulosa*, *Calocampa exoleta*, as well as several specimens of *Cidaria siterata*, *C. miata*, *C. immanata* and *Thera variata*.—A. ADIE DALGLISH, Pollokshields, Glasgow. October 9th, 1895.

SOUTHEND.—Common things are now showing up well at sugar. I found a fresh specimen of *Chesias spartiata* in the house on Monday night, and a larva of *Cerura bifida* on a fence on the 12th inst.—F. G. WHITTLE, Southend. October 17th, 1895.

CLEVEDON.—Sugar was very productive throughout September, even after the ivy was fully out. Insects at ivy, excepting on one or two occasions, have not been so numerous as usual. The most plentiful species were *Anchocelis pistacina* in great variety, *A. macilenta* and *Brotolomia meticulosa*. I took *Dichonia aprilina* at ivy for the first time this autumn. The insects most common at sugar in September were *Xanthia citrigo*, *A. lunosa*, *Mellinia circellaris*, whilst *A. pistacina* was as abundant as at ivy. There were also a fair number of *Hadena protea*, *B. meticulosa*, *Polia flavicincta*, *Amphipyra pyramidea*, *A. tragopogonis* and *Agrotis saucia*. *Plusia gamma* has been wonderfully abundant this autumn, revelling in the sunshine.—J. MASON. October 18th, 1895.

COXHORNE, SWANSEA, &c.—As far as my experience goes this has been a fairly good season. I was in Swansea off and on from the beginning of March to the end of April, but had very little time to work for moths while there. *Tephrosia crepuscularia* was decidedly scarce, especially the dark form, of which I only took one or two; I also came across *Lobophora carpinata* and *Eupithecia abbreviata*. I worked at the sawmill here when I was at home for a few days on leave, and took *Taeniocampa gothica*, *T. pulverulenta*, *T. stabilis*, *T. instabilis*, *Pachnobia rubricosa* (rare), *T. gracilis* (rare), *Anticlea badiata*, *L. carpinata*, &c. During the whole of May I was down at Milford Haven, and did nothing in the entomological way, except taking some larvæ of *Clisiocampa neustria*, which produced very dark imagines, and one ♀ *Spilosoma mendica*, from which I got a quantity of eggs, and now have a good many pupæ. In the beginning of June, at Swansea, I took *Hydrelia uncula*, *Melitæa aurinia*, *Argynnis selene*, *Melanthia albicillata*, *Euclidia mi* and *E. glyphica*. On my return home, on June 15th, I started working in earnest, and sugared and lit up my moth trap on every favourable night up to the present date, and took by both means some really good insects; besides those mentioned (*ante*, p. 89) were *Xylophasia hepatica*, *Gonophora derasa*, *Cymatophora*

*ocularis*, *Apamea unanimitis*, *Pterostoma palpina*, *Neuria saponariae*, *Caradrina alsinea*, *C. taraxaci*, *Xylophasia sublustris*, *Hyponodes costae trigalis*, *Cymatophora duplaris*, *Toxocampa pastinum*, *Geometra vernaria*, *Cleora lichenaria*, *Cerigo matura*, *Lithosia lurideola*, *Calymnia affinis*, *C. diffinis*, *Tryphaena fimbria*, *Noctua depuncta*, *Agrotis tritici* var. *aquilina*, *Platyptilia gonodactyla*, *Crambus falsellus*, *P. punctidactyla*, *Acipitilia galactodactyla*, *Noctua stigmatica*, *Luperina cespitis*, *Plastenis subtusa*, *Epunda lutulenta*, *Anchocelis lunosa* (common), *Xanthia gilvago*, *Agrotis saucia*, *Xylina ornithopus*, *Xylina semibrunnea*, *Calocampa evoleta*, *Anchocelis pistacina* (very common and variable), *Miselia oxyacanthae* and var. *capucina*, *Orthosia macilentia*, *Asteroscopus sphinx*, *Himera pennaria*, besides *Cucullia umbratica*, *Habrostola tripartita*, *H. triplasia*, *Plusia iota*, *P. pulchrina*, *P. chrysis* and *Choerocampa porcellus* at the flowers of pinks. *Eupithecia rectangulata* was very common on apple trees on one night only (June 17th), though it occurred sparingly at light afterwards. The larvæ of *Dianthoecia carpophaga* and *D. capsicola* were common during July. Day work produced *Enodia hyperanthus* ab. *arete*, and one larva of *Cuspidia alni*. *Eupithecia subfulvata* larvæ are still common on yarrow on railway banks and waste places. Noctuid larvæ have been fairly common on ribbon grass in the garden, I have obtained many by sweeping. This mode of feeding is not likely to prove favourable to their turning out to be those of *Apamea unanimitis* and *A. ophiogramma*.—(MAJOR) R. B. ROBERTSON, Coxhorne. October 28th, 1895.

MORPETH.—As far as my collecting experience goes, this season has been a little below the average in this neighbourhood. During the time that the willows were in blossom the weather was unfavourable, except for a night or two, and insects consequently proved scarce. During May, June, July and the first three weeks in August, insects were below the average in numbers. I only got one *Plusia bractea*, and *P. iota* and *P. pulchrina* were much scarcer than usual. I found a few *Cirrhodia xerampelina* at the base of ash-trees, about six p.m., towards the end of August. The weather at this time was very favourable for collecting, and I found *Noctua dahlii*, *Dyschorista suspecta*, *Epunda lutulenta* more plentiful at heather blossom (*Calluna vulgaris*) than they usually are in this locality; also *N. castanea* and *Hydroecia nictitans*. *Noctua glauca* was really scarce at heather blossom this season.—J. FINLAY, Meldon Park, Morpeth. October 28th, 1895.

DONCASTER.—Autumn sugaring has been good. The most abundant species have been *Mellina circellaris* and *Anchocelis pistacina*. I took the var. *serina* of the latter this autumn for the first time. Single specimens of *Xanthia aurago*, *Agrotis saucia* and *Calocampa retusta* came to sugar. These species are all very rare here.—H. H. CORBETT, M.R.C.S., 19, Hallgate, Doncaster. October 30th, 1895.

READING AND BASINGSTOKE.—The season certainly has not been a good average one here. Willows did not pay, the nights being too cold; although on one or two mild nights the Tenebrionids were numerous, and *T. munda* came freely to sugar on such nights. I did not take *Stenopus fagi* this year, but several of my friends did, including one specimen of the black variety. I went to Basingstoke during Whitsuntide for *Sesia sphenigiformis*, and was fortunate enough to obtain a

virgin female on the ground, and was thus able to try "assembling" for the first time with this species. The result was twelve males on the first afternoon. *Sesia formiciformis* was scarce, and I only took two poor specimens. I noticed that the larvæ of *Phigalia pelaria* were very plentiful on alder, birch, oak, &c. Sugar did not pay until July, when we tried for *Calymnia pyralina*, and succeeded in taking a few. *C. affinis* was common, but *C. diffinis* scarce. *Agrotis tritici* var. *aquilina* a few, and most of the common species due at this time were all fairly numerous. *Noctua stigmatica* was to be taken by sugaring foliage and twigs outside a beech wood; but it was not plentiful. I put up nearly all I took for ova, and the larvæ are now full-fed and going down. I find them very easy to rear, as they feed readily on most low plants—perhaps chickweed, narrow-leaved plantain, and dandelion are preferred. This year has proved a complete failure for the Xanthias; for although *Xanthia citrargo*, *Xanthia flarago* (*silago*) and *X. fulvago* (*cerago*) were fairly plentiful, *X. gilvago* was scarce and *X. aurago* came to the sugared twigs and foliage but very sparingly. *Mellinia circellaris* was abundant. Of *Epunda lutulenta* I got two or three, a few *Xylina semibrunnea*, and most of the common autumnal species were all fairly abundant, except *Typhaena orbona* and *Noctua xanthographa*, which were conspicuous by their absence.—A. H. HAMM, 24, Hatherley Road, Reading. November 4th, 1895.

TENBY.—I was at Tenby in August, but rather too late for the sandhill insects. I got *Agrotis vestigialis*, *A. cursoria*, *A. tritici* and *Actebia praeox*, off ragwort blossoms, but only sparingly. I took one *Colias edusa* feasting on burnet-rose, the only specimen I have seen this year. I visited the habitat for *Stilbia anomala* on one evening, and took ten specimens, but they were rather worn, so I did not trouble to go after them again.—E. A. BOWLES, M.A., F.E.S., Myddelton House, Waltham Cross. October 7th, 1895.

WALTHAM.—The ivy in my garden is nearly over. I visited it last evening, and got one *Miselia oxyacanthæ* var. *capucina*, and *Anchocelis pistacina* appeared remarkably abundant.—ISM.

ABERDEEN.—My collecting has been all done in the neighbourhood of Aberdeen, and chiefly confined to sugar, and until the end of June the results were very poor. On the Kincardineshire coast, *Agrotis lucerneæ* was fairly plentiful at heather-bloom during July, and a few *A. pyrophila* where also taken; whilst *Mamestra furra* and other common species came freely to sugar. In the woods during August, *Dyschorista suspecta* and *Lithomia solidaginis* were exceedingly abundant. *Noctua castanea* ab. *neglecta* was taken in some numbers, and a few *N. sobrina* put in an appearance. *Aplecta occulta* and *Epunda lutulenta* were taken sparingly; whilst *E. nigra* was fairly common. The autumn species have been more abundant than I remember having seen before.—A. E. CANNON, Mannofield, near Aberdeen. October 23rd, 1895.

KING'S LYNN.—The season here has been quite an average one, although a few species, especially of the larger ones, have been less abundant than usual. Thus *Cymatophora flavicornis* did not turn up in its usual numbers; but *Brephos parthenias* was particularly abundant. *Panolis piniperda* swarmed at sawlow bloom, as I had expected they would do, for pupæ of the same species were found in numbers

beneath moss in the Scotch fir woods during the previous autumn. *Eupithecia pygmaea* must have once again shifted its quarters, for I did not observe a single specimen during the season. I have known *E. pygmaea* change its quarters two or three years in succession, but previous to this year I have traced it, and found it within a mile of the spot in which it occurred the year before. Both *Toxocampa pastinum* and *Lobophora sexualata* have been unusually plentiful. *Agrotis cursoria*, *A. praecox*, and, of course, *A. tritici* were common on the coast sandhills; of *Agrotis agathina* I secured four specimens only, but it is difficult to get here by sugaring, hence a search had to be made for it at dusk at the flowers of ling (*Calluna vulgaris*), or an odd specimen or two can be netted just before dusk as they fly over the ling. No doubt larvæ might be swept, and some day I may be tempted to try it. I have given *Epischia farrella* a holiday this year. However, I succeeded in finding *Crambus salinellus* at home on our salt marshes, quite close to the town, although it was surprisingly local. *C. latistrius* did not turn up at all, but *C. hamellus* was as plentiful as ever. *Phycis abietella* was not uncommon at night flying on the outskirts of Scotch fir woods.—E. A. ATMORE, F.E.S., King's Lynn. November 12th, 1895.

Oxon.—The early part of the season here was most disappointing. In April and May, *Lycaena argiolus* was fairly plentiful; but *Syrichthys malvae*, which I always persecute for ab. *taras* and intermediate forms, was very scarce. *Thecla rubi*, also usually a very common insect, was almost entirely absent. *Hybernia leucophaearia* was scarce at light. Sallows, in April, were fairly productive in Taeniocamps, and on one or two evenings *Eupithecia punilata* swarmed at them. In May and June light did very fairly well, but during the greater part of July, all August and the first part of September, I did practically no collecting. In September I had two specimens of *Sphinx convolvuli* brought to me, taken by villagers, and much damaged; but though I tried *Nicotiana* for several evenings, I saw none. *Colias edusa* has not occurred, so far as I know, in this immediate neighbourhood, but I saw a few one day when shooting, between Exmouth and B. Salterton, on the cliffs. *Pyrameis cardui* was very scarce. Sugar and ivy answered well during October, and gave a few *Agrotis saucia*, *Calocampa exoleta*, *Xylina ornithopus* and *Anchocelis rufina*, besides a quantity of commoner things; but I have been unable to meet with *Dasygaster rubiginea* this season.—E. F. STUDD, M.A., B.C.L., F.E.S. Oxton. November 10th, 1895.

YORK.—On Saturday last (November 9th) I found numbers of *Cheimatobia boreata* on the leafless birches, plenty of *Hybernia auran-tiaria* and *H. defoliaria* in less numbers. I obtained two of the latter with the dark band, the rest being more or less of the brown unicolorous form. I took fourteen fine *Calocampa exoleta* from sugar the same evening. Last night (November 15th) my younger daughter brought me a fine male *Poecilocampa populi*, evidently newly emerged.—S. WALKER, 23, Portland Street, York. November 16th, 1895.

BURY ST. EDMUNDS.—*Orrhodia vaccinii*, *O. ligula*, *Orthosia macilenta*, and all the usually abundant moths seem very scarce at sugar here this autumn as compared with last.—F. NORGATE, 98, Queen's Road, Bury St. Edmunds.

## NOTES ON LARVÆ, &c.

ABUNDANCE OF PHORODESMA SMARAGDARIA LARVÆ.—The larvæ of *P. smaragdaria* were very abundant this year. I took a friend down to a locality, and we took nearly a gross in one afternoon. They can readily be seen, but you must work on hands and knees, and search even to the roots. Often by beating the plants and then parting the stems several will be found in one bunch of the food-plant.—H. J. TURNER, F.E.S., 13, Drakefell Road, Hatcham, S.E.

I can fully endorse Mr. Turner's statement as to the abundance of *P. smaragdaria* larvæ. I visited a favoured spot twice early in August, and took on the first occasion 243 larvæ, and on the second 251.—F. G. WHITTLE, 8, Marine Avenue, Southend.

PROBABLE SUBMERGENCE OF LARVÆ FEEDING ON SALT MARSHES.—I think the food-plants of *Phorodesma smaragdaria*, *Clisiocampa castrensis* and *Epichnopteryx reticella* are submerged when the larvæ are feeding, and, in the case of the first and last, when they are in pupa; although I cannot positively say that this is the case, I have often, at the time of "spring tides," seen the drift well up the river wall, above the level of the marsh, and have on various occasions found puparia of *P. smaragdaria* in their frail cocoons attached (almost always low down) to the food-plant on the open marsh, and bearing in mind the fact that *P. smaragdaria* is a larva for about ten months, I feel sure that it must get many a ducking.—F. G. WHITTLE, Southend. Oct. 19th, 1895.

I have collected the very young larvæ of *Phorodesma smaragdaria* at the end of August, on the Essex coast, and I can say with every confidence that I have taken larvæ, about an hour after the tide receded, on plants which had been submerged from twelve to twenty inches. I observed this on three separate visits.—J. J. F. X. KING, F.E.S., Glasgow. Nov. 5th, 1895.

BREEDING CALLIMORPHA HERA.—I see by reference to back numbers of the periodicals that several persons who have bred *C. hera* experienced difficulty in the pupating and emerging stages. Is this because they do not give them earth or sand? Mr. Porritt kindly sent me five larvæ of this insect early in May last. These I fed up in an ordinary flower-pot, half full of sand, upon cultivated rose. I never had less difficulty with any insects. They all pupated under the sand, and all emerged perfect specimens. Although I found three of them together, two males and one female, on a sunny morning freshly emerged, they did not "bang about," but sat perfectly quiet, and were not in the least damaged. The five proved to be two of the ordinary red type, two of the yellow ab. *lutescens*, and one of an intermediate orange colour. I began feeding the larvæ on dandelion, but found that they preferred the leaves of the ordinary old-fashioned garden rose, known locally as the "maiden blush."—J. C. MOBERLY, M.A., 9, Rockstone Place, Southampton.

---

## REVIEWS AND NOTICES OF BOOKS.

LIST OF NORTH AMERICAN EUPTEROTIDÆ, PTILODONTIDÆ, TRYBATIDÆ, APATELIDÆ AND AGROTIDÆ, by A. Radcliffe Grote, M.A. [Bremen, 1895.]—Whatever Professor Grote takes in hand we can always be sure will be well done. This *List* shows an enormous amount



of careful research, and of intelligent discrimination, and it bears no evidence of the careless and slipshod methods that distinguish some American synonymic lists. Professor Grote is especially well qualified to grapple with the difficulties that surround the subject; and now that he is devoting considerable and detailed attention to the European fauna in the Hildesheim Museum, he will stand out as pre-eminently the man to bring into working order and put on a common base the dissimilar nomenclature in use in America and Europe; for however much individual opinion may differ as to degree, there can be nothing but a general consensus of opinion that he understands better than anyone else the complications of the American system, which, to the average Eastern mind, has much of the intricacy of a spider's web, with the supposition (or certainty) of a demon lying at every nook and corner. In his particular branch the weakness of his contemporaries makes us all the more grateful for his work, and although he has not yet convinced us that his *ex cathedra* method of selecting a type is at all a good one, yet it is a method, and as such is infinitely better than none, and it is in the latter fashion that synonymy is at present worked by our specialists. His footnotes are to the point, often amusing, sometimes sarcastic, always interesting; but no author yet seems to know anything about British genera, or to recognise that our generic groupings are usually more real and more natural than the often large and unwieldy genera of the Continent. Professor Grote seems to have no more knowledge of these than his contemporaries, hence his list does not help the purely British collector much; and yet this is hardly correct, for the genera which we use in common with our Continental brethren are somewhat amply dealt with. We would like to have a fling at Hübner's *Tentamen*, but forbear. Lord Walsingham is admitting its right to rank, and if only our synonymists will settle something definitely and say—This is the name, it can undergo no alteration! we would forgive them much, and we would even swallow our own personal opinion of the scientific value of poor old Hübner's *Tentamen*. This *List* of North American Noctuids is by far the best thing on American synonymy that lepidopterists have recently had offered them, and we congratulate the author on his careful production.

---

## SOCIETIES.

At the meeting of the ENTOMOLOGICAL SOCIETY OF LONDON, Lord Walsingham announced the death of Mons. E. L. Ragonot, President of the Entomological Society of France, and, since 1887, a Foreign Fellow of the Entomological Society of London. He remarked that Mons. Ragonot was especially distinguished by his knowledge of the *Phycidae* (a monograph on which group he had brought out in Russia), for his amiable personal qualities and for the readiness he showed to assist other workers in the identification of species. Mr. Stevens exhibited two larvæ, supposed to be those of a species of *Anobium*, which had been damaging oil paintings in his possession; also two specimens of a luminous species of *Pyrophorus*, which he had received alive from the West Indies. Mr. Adkin exhibited a portion of a collection of Lepidoptera made in Hoy, Orkney, in 1895,

including the following species, *viz.*, *Agrotis vestigialis*, *A. tritici* and *A. cursoria*, not previously recorded from Orkney; *Nemeophila plantaginis*, having the usual yellow ground-colour of the hind-wings replaced by red in many of the females; *Hepialus humuli*, males of the ordinary white form, bearing no resemblance to the Unst (Shetland) form, var. *hethlandica*; *Tryphaena orbona*, all very dark, the fore-wings almost black, the yellow of the hind-wings of many of the specimens much obscured by blackish scales. *Epunda lutulenta*, some almost uniformly black, others pale grey with dark markings; *Taeniocampa gothica*, including var. *gothicina*; *Hadena adusta*, one almost black, others much variegated; *Thera juniperata*, many having the central fascia and apical streak very dark brown; and *Hysipetes sordidata*, varying from blackish brown to pale green. Mr. Tutt exhibited a series of *Emydia cribrum* var. *candida*, which Dr. Buckell had bred from eggs obtained from a specimen caught by Mr. Merrifield in May, 1895, in Northern Italy. He stated that the beautiful bead-like eggs went through a series of colour changes from yellow to leaden or blue-black, as the embryo matured within, and that when they hatched being perfectly unable to get what is generally considered their food-plant, *viz.*, ling, he remembered that "ling" did not occur where they were found—rough grassy spots—and accordingly tried them with the ordinary grass growing in his garden, and gave them, in addition, that excellent all-round food for lepidopterous larvæ—knot-grass (*Polygonum aviculare*). They took to both, and by July had moulted twice, and were evidently still feeding on when they were sent on to Dr. Buckell to deal with whilst he was away on the Continent. On his return, Dr. Buckell informed him that they had gone ahead, and in early September gave him a number of the earliest-formed pupæ, which emerged in about three weeks. The later larvæ pupated during the next fortnight or three weeks, and the imagines have since emerged, the last on October 16th, and it was a part of the brood that was being exhibited to-night. Mr. Tutt added: "It occurs to me to draw attention to the following points:—(1) That breeding them in England (even indoors) has resulted in producing the brood at least six weeks later than the corresponding one on the Continent. It will be remembered that British *E. cribrum* is single-brooded, it being only on rare occasions that an odd specimen of the second brood is obtained. (2) That this delay in feeding up has not been accompanied by any change whatever in the general appearance of the insects. They have bred true to type, and are of the same type exactly as the ♀ parent. (3) That of the first 21 specimens bred only two females occurred; that of the last 23, only five were males. (4) That there should now be no difficulty in breeding our British form on two such excellent substitute (natural?) foods as ordinary grass and knot-grass." The Rev. Canon Fowler exhibited, on behalf of Professor Poulton, living specimens of *Diapheromera femorata* bred from eggs received from Prof. E. B. Titchener, of Cornell University, New York. He stated that the young larvæ had emerged from the eggs in July and August last and fed on lime. Several pairs had arrived at maturity, and were feeding in cases in the Oxford Museum. The Rev. J. H. Hocking exhibited a specimen of *Xylina lambda*, taken by him at sugar on the trunk of an oak tree, at Copdock, near Ipswich, on the 30th September last. It was in beautiful condition, and had apparently only recently

emerged from the chrysalis. He also exhibited two specimens of *Xanthia ocellaris* taken at the same time. Mr. R. W. Lloyd exhibited male and female specimens of *Amara alpina* from Garvell, Perthshire. Colonel Swinhoe stated that he had, during the past summer, captured four specimens of *Pieris daplidice* at Deal. He said they were worn and had probably been blown over from France. Mr. Tutt remarked that he had collected at Deal for many years, but had never met with *Pieris daplidice*.

At the meeting of the SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY, on October 24th, 1895, Mr. Frohawk exhibited two specimens of *Acherontia atropos*, one of which had been washed ashore in Glamorgan, and the other had been taken at the lighthouse of St. Agnes, Scilly. Mr. McArthur showed a series of *Noctua festiva*, taken in the Orkneys this year. Mr. West: a bug (*Zierona caerulea*), taken by Mr. Billups on the fungus table at the society's exhibition. Mr. Carrington and Mr. Frohawk reported having seen fresh specimens of *Colias edusa* on the South coast on October 20th.—On November 14th, Mr. Briggs exhibited a living specimen of the Madeira cockroach (*Panchlora maderae*), taken in Covent Garden Market. Mr. R. Adkin: a series of *Emmelesia taeniata* from Co. Kerry, which were lighter than the English form; also a specimen of *Arctia caia* from Co. Louth, with very intense black-brown markings. Mr. McArthur: living larvæ, and a recently emerged imago of *Tryphaena orbona* var. *curtisii* from Orkney; he said that all the specimens captured there were of this form. Mr. Mansbridge: a series of *Hypenodes albistrigalis*, taken at sugar in Epping Forest. Mr. Sturt: a living larva of *Sphinx convolvuli* from Cornwall, and drawings of the others he had had; one specimen was of the rare striped form. Mr. South: a short bred series of *Acronycta menyanthidis* from Macclesfield; he stated that the larvæ much preferred fallow, although a few fed on birch.

At the meeting of the NORTH LONDON NATURAL HISTORY SOCIETY, on November 14th, Mr. Prout opened a discussion on "THE RARE HAWK MOTHS," in which he included *Acherontia atropos*, *Sphinx convolvuli*, *S. pinastri*, *Deilephila euphorbiae*, *D. galii*, *D. livornica*, *Choerocampa nerii* and *C. celerio*. He applied himself exclusively to the problems of their geographical distribution, and very uncertain appearance in different parts of the world. Setting aside for this purpose all scientific classification, he suggested the following division of the species: (1) Species on the border-line between "rare" and "common," yet presenting some interesting problems regarding distribution, &c., which perhaps rendered them worthy of a place in the discussion. In this division, Mr. Prout would certainly include *Acherontia atropos*, and possibly *Sphinx convolvuli*. (2) Species extremely rare with us, but common on the Continent. Here belonged *Sphinx pinastri*, *Deilephila galii* and *D. euphorbiae*, though Mr. Prout mentioned that *S. pinastri* would probably have to be studied on quite a different basis. (3) Species rare and uncertain in their appearance throughout the greater part of Europe, being apparently natives of the far south. Here belonged *Choerocampa nerii*, *C. celerio* and *Deilephila livornica*. Dealing with *Acherontia atropos*, Mr. Prout argued the question as to whether or not it was truly indigenous in Europe, and suggested that an interesting point concerning it, is whether it was imported with the potato, or whether it originally fed entirely upon

other *Solanaceae*, and had but recently acquired its preference for its present food-plant. With regard to *Sphinx convolvuli*, Mr. Prout thought there was much room for difference of opinion, the larva and pupa being so rarely met with, whilst the imago appears much more commonly than the actual rarities of the family. He thought it was impossible to look upon it as a mere "casual" visitor or imported species. Of the 2nd division, Mr. Prout said that *Sphinx pinastri* "now occurs annually in a certain restricted district in Suffolk, and the question is—Is it indigenous there, or how and when was it introduced? The two *Deilephila*s probably do not occur annually in any part of the British Isles." In the 3rd division, Mr. Prout said it should be borne in mind, in forming our theories with regard to *Chorocampa nerti*, that some of the specimens have turned up in the metropolis, and that it has never been taken otherwise than singly. '*C. celerio* is one of the most widely distributed of all Lepidoptera, ranging over Asia, Africa, Australia and Southern Europe, and feeding almost exclusively on the vine. Mr. Prout thought that these two were obviously not genuine natives here. Proceeding to mention one or two curious circumstances connected with the moths, Mr. Prout said that the majority of records for all the species, except *S. pinastri*, belonged to the late summer or autumn months, and that where records for the spring or early summer were found, the specimens were generally worn, so that they had been regarded either as immigrants, or as hibernated examples. Yet in their own proper habitats nearly all the species appeared to have also a genuine summer brood. Mr. Prout further noted that the great preponderance of our "casual visitors" amongst all the Lepidoptera, as well as those species which, though never entirely absent, occur occasionally in enormously increased numbers, appear with us at the same season of the year, though the majority again have also a summer brood in their true homes. Again, there was the yet further coincidence that a large number of these species have been suspected either of hibernating or of appearing pretty continuously throughout the winter in warmer climates, and certainly several of them could be brought to additional broods in the winter when reared in captivity. And finally, there was evidently something abnormal about the conditions of these autumn-emerged specimens; the females were frequently either partially or entirely sterile, or if eggs were laid they could not be brought through their transformations; the larvæ usually seemed incapable of hibernating, and perished unless they could be fed up in artificial warmth. In the face of these coincidences Mr. Prout was disposed to conjecture that there must be some one broad general principal underlying and governing the migratory propensities of these species, and to account for the comparatively trivial variations of habit in matters of detail by reference to some merely secondary climatic or phytophagic influences; and that such principle, if existing, must assuredly be one of no mean biological importance. Mr. Nicholson gave some interesting details with regard to *Sphinx pinastri*. He had read a note in the *Entomologist* to the effect that it fed on cedar. He thought that immigration was responsible for the appearances of *Deilephila euphorbiae*, *D. livornica*, *D. galii* and *Chorocampa celerio*. Mr. Bacot remarked that these moths were all of one form, with large eyes, strong wings, &c., an argument in favour of

immigration. They occurred all over Europe and Asia, and over the greater part of Africa and Australasia, but there seemed to be none in America. Probably they could not stand the cold. They depend solely on flight, and spread more widely every year. *A. atropos* and *S. convolvuli* were not truly British, as they do not generally breed here. He doubted if even *Macroglossa stellatarum* was firmly established. Mr. R. W. Robbins mentioned the capture of a specimen of *D. galii* in 1888, on Stamford Hill, and one had also been taken in the house of Mr. Simes, a former member. Larvæ were also reported from the Lea Marshes. He had heard of *C. nerii* having been taken in Poplar. If so, it was probably imported. He agreed with Mr. Bacot as to the similarity of the moths with regard to general structure, *e.g.*, the large feeding of the caterpillar and comparatively small body of the imago. The food evidently goes to store up energy, which produces their strong flight, and hence their wide distribution. The recent successive occurrences of *D. euphorbiae* might possibly have been due to its having immigrated to some mild locality, and bred there for a few seasons. Its then sudden disappearance might have been due to an unusually severe winter. Mr. Harvey mentioned the discovery of a specimen of *Acherontia atropos*, on the ship of Mr. Woodward's father, when she was off Gravesend, outward bound. He also remarked that Mr. Culpin had sent over specimens of *S. convolvuli* from Australia. He did not think the wings of these moths were better adapted for flight than those of the BOMBYCIDÆ. Mr. C. B. Smith thought there were reasonable grounds for not considering *Macroglossa stellatarum* and *Acherontia atropos* British species. They occur very irregularly, and *S. convolvuli* and *A. atropos* were generally to be found together. The latter sometimes lies over the winter, and emerges the following June, but this, he thought, was a purely accidental circumstance. He thought that *A. atropos* bred here very often, if not very regularly, but of *S. convolvuli* he was doubtful. Mr. Prout, in reply, said that a specimen of *C. celerio* was brought to Mr. Hanbury a month ago. *Sphinx pinastri* was probably imported here accidentally, and managed to settle down. Perhaps a bad winter put them down for a time, and they were overlooked, but they turned up again, and have probably come to stay. He agreed with the remarks of Messrs. Nicholson and Bacot as regards the others.

The indefatigable secretary of the NORTH LONDON NATURAL HISTORY SOCIETY has arranged an attractive programme for the first half of 1896. The annual exhibition is to be held on January 4th; on February 27th Mr. Tutt will read a paper; on March 12th Mr. Nicholson will open a discussion on the family *Amphipyridæ*; on May 14th, Mr. Tremayne will deal with Termites; and on June 25th, Mr. C. B. Smith will contribute some notes from North Wales. Excursions will take place on May 16th to Epping Forest, on May 22nd to the New Forest, and on June 18th to Oxshott.

At a meeting of the NONPAREIL ENTOMOLOGICAL SOCIETY, on November 7th, Mr. Norman exhibited living specimens of *Himera pennaria*, *Hybernia marginaria*, *H. leucophaea*, *H. defoliaria* and *Arctia caia*, all bred by himself during the preceding week in an outdoor breeding cage. He also announced that he had larvæ of a third brood of *A. caia* feeding at the present time. Mr. J. G. Craft exhibited specimens of *A. caia* which emerged during the second week of September.

# The Entomologist's Record AND JOURNAL OF VARIATION.

---

VOL. VII. No. 7.

JANUARY 15TH, 1896.

---

## Some Aspects of Hibernation.

By F. A. DIXEY, M.A., M.D., F.E.S., Fellow of Wadham College, Oxford.

The following remarks have been put together in compliance with a request from Mr. Tutt for some expression of opinion on the subject of two recent papers, by himself and Mr. Kane respectively,\* dealing with the phenomenon of hibernation.

Before making any special comment on the papers themselves, it may be as well that I should clear the ground by offering a few considerations on the general question.

It is well known that in most regions of the globe all organisms are subject to a periodical alteration of their environment, dependent on the change of seasons. These variations of environment are in the first place meteorological, the most important being changes in respect of temperature and moisture. To each of such changes in meteorological conditions every organism responds in its own characteristic manner; the modes of response differing in an almost endless variety of ways, and being determined in some cases directly by the influence of the new conditions on the organism itself, in others indirectly through the effect produced on other organisms. For example, in the temperate regions of the earth many trees lose their leaves on the approach of winter. This effect may so far be considered a direct one, but it carries with it various indirect consequences in respect of the life of insects which feed on the leaves, and birds which feed on the insects. The interruption of the usual food-supply is met sometimes by a change of diet, sometimes by a change of locality (migration), sometimes by a suspension of bodily activity (hibernation). Those observers who, with Darwin, see in natural selection a sufficient cause for the transmutation of species, will have no difficulty in attributing to the same agency the formation of the various habits involved in the adoption of these several modes of defence against the incidence of adverse external conditions. Under the operation of natural selection, the change of habit will be an entire or partial one according to the needs of the species; it will proceed by successive modifications of some already existing characteristic, and it will also, of course, be limited in accordance with the physiological possibilities of each several organism. Bearing these

---

\* "The Resting Habit of Insects as Exhibited in the Phenomena of Hibernation and Estivation."—*Entomologist's Record*, Vol. vii., 1895, p. 1; *Ibid.*, p. 52.

principles in mind, let us proceed to a consideration of the papers before us.

Mr. Tutt begins by a discussion of certain statements made by Professor Weismann in his Romanes Lecture at Oxford, "On the Effect of External Influences upon Development." The professor is insisting upon the distinction to be drawn between such changes in the individual organism as are the immediate and direct result of a change in external conditions, and such as only indirectly follow an alteration in the environment; such changes, in fact, as are really due to, and characteristic of, the already existing constitution of the organism, and only need an external stimulus of whatever kind to set them going. As an instance of the latter species of change he adduces the hibernation of the marmot, which, as he points out, is a phenomenon immediately dependent on the intimate structure peculiar to the tissues of the marmot, as distinct from non-hibernating mammals; and not on the external circumstance of cold, which is in itself, as we see in the case of ordinary mammals, powerless to produce the winter sleep. Cold, however, Weismann implies, though not the *causa efficiens* of hibernation, constitutes, in the case of the marmot, the requisite external stimulus for the assumption of that condition; to use a figure familiar to logicians, it supplies the first link in the chain of causation, or pulls, as it were, the trigger of the already loaded gun.

To these statements Mr. Tutt objects that cold cannot be the actual stimulus inducing hibernation, inasmuch as the winter sleep itself is merely the last term in a complex series of changes, and these begin with the ingestion of unusual quantities of food before the cold period has yet arrived. It is possible that Mr. Tutt may be right in supposing that cold is not in this case the actual stimulus which calls into play the characteristic winter slumber; but the point is of small importance, for Weismann's only contention with regard to hibernation is, that cold is *at best* a stimulus, giving, so to speak, the signal for action to the already prepared organism.\* Cold is not the immediate cause of this physiological condition, and might without damage to Weismann's argument be even denied the function of a stimulus. It must, moreover, be carefully borne in mind that Weismann is here only referring to the relation of the cold of any one autumn in the life of a marmot, to the hibernation which is entered upon at that particular time by that actual individual. He would, of course, not think of denying that the organism of the marmot has become adapted for hibernation under the operation of natural selection, in order to meet the vicissitudes of environment caused by a periodical accession of cold.

Turning from the case of the marmot, Mr. Tutt recalls to our recollection various interesting instances of hibernation in the lepidoptera, which are quite enough to show that, however the case may be with the hibernating mammal, the assumption of the like condition in insects is not necessarily dependent on the action of cold as a stimulus. The case of *V. urticae* is a specially interesting one, inasmuch as it affords evidence of a kind of physiological dimorphism, if the expression may be allowed, within the limits of the same brood.

\* See a re-statement of the same position by Weismann, "Neue Versuche, etc." *Zool. Jahrb.* Jena, 1895.

A phenomenon analogous to this is the variability in the duration of the pupal condition that is well known to occur in many species. In some of these cases the pupæ of the same generation may be physiologically differentiated into two groups, maturing at different rates, and giving two distinct emergences of the perfect insect; one perhaps in the same summer, the other in the following spring. The instances of hibernating larvæ, referred to by Mr. Tutt, where some individuals of any given brood will occasionally complete, or attempt to complete, the whole series of changes within a single season, are also due to a similar physiological dimorphism. The advantages to a species of such dimorphism are obvious—on the one hand it is in favour of the continued existence of the species to get through as many successive broods as possible in the course of the year; on the other hand, there is a risk under these circumstances of the whole of one generation being cut off by an abnormally early winter, or by some other adverse condition. If, however, a part of each brood is as it were held in reserve, a provision is thereby afforded against the incidence of such catastrophes, and the species, by means of its dimorphism, is enabled to tide over the serious thinning of its numbers that they involve. If such an arrangement exists in the case of *P. cardui*, this would to some extent account for the curious facts relating to its intermittent prevalence in this country, as recounted by Mr. Tutt.

The main point to be observed with regard to all these cases is, that they are invariably such modifications of habit as may well be supposed to have arisen under the influence of natural selection. Each species meets the exigencies of the case in its own way; some may be supposed to be still undergoing adjustment, others have attained a state of comparative equilibrium. The actual time of year at which a species goes into hibernation, the stage of development in which its period of repose occurs, and the uniformity, or otherwise, in the behaviour of the members of each brood, are all points that may be expected to differ in relation with other circumstances which it is needless to enumerate. Natural selection, in pointing out, so to speak, the best or most practicable road for each species to take, will give full consideration to all the circumstances under which that species has already found it possible to maintain its existence. If the foregoing be allowed, it will be seen that the question of the actual nature of the inducing stimulus becomes of minor importance. The stimulus may differ in every case. Under natural selection anything may be taken to serve as the stimulus, provided only that it touches off the appropriate mechanism at the right moment for the species. It may be an external change in one case, an internal condition in another. It is probably, in many instances, the simple lowering of the temperature; in others it may be repletion with a certain diet; in others, again, mere contact with the outer air on escaping from the pupal integuments. It is even conceivable that in some instances no stimulus is required at all.

Many of these points have been clearly put by Mr. Tutt in the latter part of his paper; he has, however, as it seems to me, somewhat failed to appreciate the distinction between (1) cold considered as an external condition, exercising, whether directly or indirectly, a selective influence upon organisms, and in that sense leading to



their modification; and (2) cold considered as a mere stimulus, in response to which the hibernating condition may be periodically assumed—the power of hibernating having been already established by a longer or shorter course of natural selection, but the organism needing in some instances a signal, as it were, to set the machinery going at the appropriate time. The distinction is implied, though perhaps not expressed, in the statements quoted from Weismann; and if it be kept in view, all apparent inconsistency in the latter writer's argument will disappear.

Mr. Kane, no less than Mr. Tutt, acknowledges the adequacy of natural selection for the production of the hibernating habit in its various degrees of manifestation; but by calling in the aid of "inherited habits, morphological adaptations and acquired instincts (which may be termed ancestral memories)," to supplement the simple operation of natural selection, he is treading on highly debatable ground, and will certainly fail to carry many biologists with him. There would be hardly the amount of agreement that he appears to anticipate in the position that "acquired habits . . . play an important part in animal evolution," though that doctrine would assuredly meet with the approval of Mr. Herbert Spencer. Mr. Kane is no doubt right in holding that some forms have not yet fully adjusted themselves to their present conditions, and his excellent suggestion that full observations should be made and recorded of the behaviour of various species under natural conditions, in different climates, ought to be widely taken up. Some detailed knowledge is already available on this point, but far more is wanted.

There still remains the question of the physiological history and meaning of the winter sleep. Mr. Kane points out that cold directly induces torpidity among both the higher and lower animals. But he would seem to overlook the fact that, as was clearly shown by Marshall Hall, the torpor directly induced by cold in the higher animals is physiologically quite distinct from hibernation. The ultimate origin of the habit is no doubt to be sought, as Mr. Tutt suggests, in the capacity for rest possessed by all protoplasm. Physiologists know that every tissue in the body has its alternating periods of rest and activity, succeeding one another rapidly or slowly, rhythmically or irregularly, with apparent spontaneity or in answer to a definite external stimulus, according to the various parts to be played by the particular tissue in relation to the life of the entire organism. The same phenomenon in the case of the protozoon is recognisable by every observer. Take, for instance, the alternation of rest and activity exhibited by a vorticella—now in response to an external stimulus, now apparently resulting from causes arising within the unicellular organism itself. This capability of protoplasm gives the requisite material for natural selection to work upon, and we find accordingly few groups in the animal world in which some means of the nature of hibernation or protracted quiescence is not adopted as a defence against certain vicissitudes in the environment. As far as the lower forms of life are concerned, the matter is a simple one; and the physiologist knows that what applies to an unicellular organism like the vorticella, applies in the main to each component cell of the various tissues that make up the bodies of the metazoa. But with every successive step in the upward scale, fresh coordinations and

fresh adjustments become necessary. The physiological division of labour between different cells that begins to occur with the first association of morphological units into a compound individual, takes charge of the hibernating as of other functions. A give-and-take arrangement is set up between different tissues, with a special view to hibernation, the whole being bound together and placed in relation with the outer world by means of the universally coördinating mechanism of the nervous system. The problem to be solved in the case of one of the higher vertebrates is no doubt far from being a simple one; natural selection however proves itself equal to the task, and provides, as we have seen, a successful balancing of all the bodily functions in the nice relations required by a complex animal during its period of winter inactivity. The acme of complication is reached in the case of the hibernating mammal, in which the requisite adjustments reach an extreme degree of delicacy, all brought about with the utmost precision under the influence of natural selection.\* But the hibernation of the insect, though so far removed in degree from that of the mammal, is but another term in the same physiological series; and, *pace* Mr. Kane, few physiologists will doubt that both alike are foreshadowed in the resting periods of the protozoa.

---

### The Introduction of *Callimorpha hera* into Britain.

By W. A. LUFF.

I was much interested in Mr. Tutt's able article on *Callimorpha hera*, in the December 1st number of the *Entomologist's Record*. I have seen this lovely moth on the wing every year in Guernsey or Sark for the last thirty years, and when I was actually engaged in forming my collection of Guernsey lepidoptera I have captured many dozens of them. They are, or rather were, much commoner in Sark than in Guernsey; but now that this lovely little island is overrun with English tourists in the summer season, they stand a fair chance of being exterminated. It was no uncommon sight to see two or three together on the flower-heads of *Eupatorium cannabinum* in company with *Vanessa io*, or the beautiful green rose-chaffer (*Cetonia aurata*) all busily engaged in sucking nectar from the flowers. They, however, seem to have a preference for the coast, and I got most of my specimens from the ivy, which here and there hangs in thick masses over the rocky cliffs. By pelting pebbles into this ivy I was sure to disturb many of them; they would soon settle again on the side of the cliff, and be marked down and easily captured. I only wonder that it has not become common in England before. I have at various times sent numbers of the eggs and larvæ to various correspondents, and I read in a Guernsey *Guide Book*, published in 1863, that Dr. Lukis, an enthusiastic Guernsey naturalist, sent a large supply of eggs and larvæ to a well-known author on British Lepidoptera, who, he states, set a number at liberty, with the result "that they spread in all directions, so as to claim a place in the British list."

---

\* It is remarkable that the "homothermic" mammal, when hibernating, may lose its characteristic power of heat-regulation, and may resume the "poikilothermic" condition of the lower vertebrate or new-born infant. See Pembrey and Hale White; "Proceedings of Physiol. Soc.," p. xxxv., *Journal of Physiology*, 1895.

The variation in colour of the hind-wings, which Mr. Tutt mentions as one of the peculiarities of the British specimens, is very common with us; I have a series showing all the gradations, from bright scarlet to light yellow, not bred specimens, but captured ones. This seems to me to point out the true originators of the British specimens.

When we see the number of British tourists who annually visit these islands, many of them interested in natural history pursuits, it is no wonder that some of them would do their best to introduce so splendid an insect into the British fauna.

I can scarcely believe that the old collectors in Devonshire could have missed so conspicuous an insect had it existed there in their time.

I find that *C. hera* is very little given to variation, except in colour of the hind-wings, and I would like to draw attention to a variety which I bred in 1875, with the two large central creamy bands on the upper wings almost obliterated. I presented this specimen to the late Edward Newman, who published a figure and description of it in the *Entomologist* of February, 1876.

---

### Retrospect of a Lepidopterist for 1895.

By J. W. TUTT, F.E.S.

Another year has drawn to a close, and 1895 has now to be numbered with the past. Wherein, from various entomological points of view it has differed from previous years, it may be worth while to enquire, and for this purpose we may take the year's work *seriatim*.

From the collector's point of view 1895 has been a "good" year, a year in which butterflies and moths have been more abundant than is generally the case, in which moths have come to sugar, and in which staring blanks in collections have slowly but surely become obliterated. It has not been especially a "butterfly year," although the usual local species have been taken in their respective haunts. There was no influx of *Pieris daphidice*, *Argynnis latona* or *Colias hyale* in June, to produce a sufficiently large brood in August, to fill our magazine with records of these rare species; although four new specimens of the first-named are recorded by Colonel Swinhoe as having been captured at Deal, in August. *Colias edusa* has had one of its hitherto inexplicable years, a year in which almost every collector in the southern counties saw a few specimens during August, September, October, and even in November (Mr. Carrington saw one on the 9th), and yet it occurred nowhere in any quantity. One can only explain such years as these by supposing that the spring wave of dispersal of this species left only a stranded remnant on our shores. We hear of *Lycaena arion* having another nail driven into its coffin; of the spirits that yearly haunt the New Forest catching fewer *A. paphia* var. *valesina* than usual; of *Apatura iris* failing to appear; of a great autumnal abundance of *Grapta c-album*; but of the rest the record is very meagre indeed.

Of moths, however, the collector has more to tell. The large *SPHINGIDES* have been represented by *Sphinx convolvuli* in immense numbers. I estimate, from what I have heard and read, that 500

specimens must have been captured. Not only has this been so, but larvæ have been obtained in considerable numbers during the late autumn in the south-western counties, thus showing that the insect appears to pass the winter here in the pupal stage, as it does on the Continent. *Acherontia atropos* has not been uncommon, whilst the Hon. F. Thellusson records not only the successful capture of imagines, but the successful beating of the larvæ of *Sphinx pinastri* in the pine-woods of Suffolk. *Chaerocampa celerio* and *Deilephila livornica* have been recorded in our pages; but, in spite of all attempts, no *Smerinthus ocellatus-populi* hybrids have been bred. Among the Arctiids, *Callimorpha hera* has proved "the moth" of the season. Mr. G. T. Porritt was to the fore in breeding the species, a large brood having been successfully hybernated, and above a couple of hundred moths (so it was stated at one of the South London Society's meetings) bred therefrom. It turned up in moderate abundance again in August, and Mr. Hewett records some two thousand two hundred and sixty-one eggs from his captures.

It is, however, among the NOCTUIDES that the greatest successes of the season are to be counted. First and foremost is the capture of *Mesogona acetosellæ*, a species new to the British list, captured by Mr. T. Salvage, at Arlington, in Sussex. Next stands the capture of *Xylina lambda*. One hears of *Viminia albovenosa* as being so abundant at Wicken that the captor ceased because he became tired of taking so many specimens of one species; the insect was equally abundant in both broods. Then one hears of fifty specimens of *Pachetra leucophaea*, and nearly as many *Agrotis cinerea*, in a night or two in the Wye District, in the first days of June, and yet for years they have been—nay, still are—among our rare moths. A few *Cuspidia alni* larvæ are reported, but domestication has caused this to cease from being a rare species. *Leucania obsoleta* has been exceedingly rare, but *Nonagria cannae* was more abundant than usual in its haunts at Horning Fen, and we hear of large numbers of pupæ having been taken. Most of the summer species were fairly abundant, and *Plusia moneta* occurred in sufficient abundance in Kent to place it in the market (the ultimate fate of all our rare British insects). Two cases of breeding *Cucullia gnaphalii* have come to hand, one from a Surrey, the other from a Kent locality. But it was not till the autumn that insects positively swarmed at sugar in the South. They continued to do so in the North, and, indeed, had done so nearly all summer. In Shetland, *Noctua glareosa* ab. *suffusa* and *Noctua confusa* were abundant, and many *Crymodes erulis* were taken. In Orkney nothing very special occurred except black *Hadena adusta*, and some pretty Noctuid species—at present recorded as *Noctua festiva*, but evidently including two other species. On the Scotch coasts, in June and July, Noctuids were literally in thousands—*Noctua depuncta*, *N. sobrina*, *Tryphaena subsequa*, &c.; on the South coasts, in September, *Agrotis obelisca* and *Aporophylla australis* were in the greatest profusion, whilst *Leucania albipuncta* occurred on the coasts of the Isle of Wight in numbers hitherto quite unknown; nor was it confined thereto, for the coasts of Kent also produced a share. Inland, *Xanthia ocellaris* occurred in many localities—Gloucestershire, Surrey, Kent, Suffolk, among others—and their variation is very interesting, scarcely two specimens being quite alike, whilst three or four more *Catocala fraxini* have been added to the few recorded British captures.

Among the GEOMETRIDÆ, Mr. Christy's success in rearing *Nyssia lapponaria* is far and away the best record, especially when we consider that an unique specimen was all that had been previously recorded, although from a scientific point of view the chance pairing of a late female *Euponia angularia* and male *E. autumnaria* (*albivaria*), which produced fertile eggs, and from which Mr. Davis reared a brood of hybrid imagines, is of perhaps almost equal interest. Large numbers of pupæ of *Eupithecia jasiioneata* will probably yield specimens to many collections, whilst *Emmelesia taeniata*, too, we understand, was taken in considerable numbers in Ireland by the professional collectors. The Orkney *Coremia munitata* were peculiar, and *Cidaria sagittata* is recorded from Wicken—the first for many years.

Among the INCOMPLETÆ, the principal capture, perhaps, was *Frumea betulina*, by Mr. W. H. B. Fletcher, in the New Forest, whilst a large number of *Sesia scoliiformis* were taken in Ireland, a useful additional locality to the Scotch district, which bears, it is said, remarkable signs of having been considerably overworked during the last two years; a result, I fear, which is sure to take place wherever professional collecting occurs over a limited area, however thoughtful, careful and conscientious the collector may be. *Zygana exulans* appears to have been as abundant as ever, and the Shetland *Hepialus humuli*, with its yellow males, was taken in considerable numbers. Time was, when collectors of the smaller species were infinitely more scientific than their brethren who confined themselves to catching and buying the larger species. In those days one heard of the habits and life-histories of the "smaller fry." They were collected by those who loved them; but the Micro-man now hoards his ground like any Macro-hunter, and although he is most willing to read the notes of his good-natured brothers of the net, he rarely puts pen and ink to paper on his own account. A professional collector, he avers, could exterminate many a rare species in a short time if its habits were explained, and its food-plant published, and largely one feels it is true. 'Tis a sorry thing for scientific entomology, though. Mr. N. M. Richardson stands out among the collectors of the smaller species with the addition of *Tinea vinculella*, H.-S., to the British list. Mr. E. A. Atmore records the more than usual abundance of *Dioryctria abietella*; Mr. Thurnall the breeding, after some sixteen years, of *Alispa angustella*; Dr. Wood gives some short notes on the life-histories of certain TORTRICIDÆ; Mr. Bower a short note on *Scoparia basistrigalis* in Kent, but the oracles of Messrs. W. H. B. Fletcher, Eustace Bankes and Lord Walsingham, are dumb.

There have been few really good scientific papers published this year, although there can be no doubt that the general level of the printed matter has been raised. The "epoch-marking" paper of the year is undoubtedly Dr. Chapman's "Notes on Butterfly Pupæ, with some remarks on the Phylogenesis of the Rhopalocera" (*Ent. Record*), and this leads me to suggest that 1895 will be handed down to future generations as that in which evolutionary theories as to classification took shape and structure. They have been seething for a quarter of a century now, but the papers of Chapman, Dyar, Comstock, Kellogg, Packard and Hampson, and the discussion which has grown out of them, have largely welded together the heterogeneous material, and given us a firm basis on which classification must proceed. Most of

this work is to be found in the American magazines. What the lepidopterist of the old school, the collector *per se*, and the unread, think of these things, science cannot stop to enquire! but to the vast army of young lepidopterists, whose shoulders are already to the wheel, there can be no doubt what it means. It means that they will absorb, as part of their entomological alphabet, the facts that have caused the present race of lepidopterists so much study and pains to formulate, that they will learn in their youth what others have reached with toil in middle age, that they will be able to formulate progressive views which will leave the present leaders in the back-ground, and thus help on the ever advancing wave of human thought and knowledge. Here, too, we would offer a word of warning to those comparatively young lepidopterists who are on the borderland of advance, and yet are likely to fall back. It is easy to read now the various papers on the subject, and to grasp their bearings. The papers in the *American Naturalist* for the current year, and those in the *Trans. Ent. Soc. Lond.*, will give them the information they want. In a few years they will feel hopeless, and fall back in many cases into the strange mixture that forms the tail of our entomological word.

On the *Transactions of the Entomological Society of London* we shall find another of Dr. Chapman's remarkable papers entitled: "Notes on Pupæ: *Orneodes*, *Epermenia*, *Chrysocorys* and *Pterophorus*." Here we have an attempt to work out systematically, a few of the heterogeneous groups hitherto included under the name of *TINEINA*; whilst "Notes on the Secretion of Potassium Hydroxide by *Dicraura vinula*, and similar phenomena in other Lepidoptera," by Oswald Latter, M.A.; and "An attempt to correlate the results arrived at in recent papers on the classification of Lepidoptera," are to be found in the same volume, and appeal particularly to British lepidopterists. Other papers to be read are:—"The Genus *Smerinthus*," by A. Bacot (*Ent. Record*); "The British representatives of the genus *Caradrina*," by L. B. Prout, F.E.S. (*Ibid.*). A series of notes "On the nature of insect colours," by W. Riding, M.D., F.E.S.; R. Freer, M.B.; and the Rev. C. R. N. Burrows (*Ibid.*); "Hybernation and Æstivation," by W. F. de V. Kane, M.A., F.E.S. (*Ibid.*); "Parthenogenesis or Agamogenesis" (*Ibid.*); "Variation considered biologically" (*Ibid.*); "Notes on *Noctua festiva* and *Noctua conflua*," by F. J. Hanbury, F.L.S., F.E.S., a very careful paper, and "*Cænonympha typhon* and its varieties" (*Ibid.*), by Dr. F. J. Buckell, excellently worked out; nor can we quite pass over the entrance of Professor Grote into the arena of British lepidopterological polemics, although we frequently disagree with his views. In the *Entomologist* there appears to be only one paper of the slightest lasting importance to British lepidopterists: "On the cause of Variation and Aberration on the Imago state of Butterflies, with suggestions on the establishment of New Species," translated from the German by Dr. F. A. Dixey; besides "The Catalogue of Irish Lepidoptera," by W. F. de V. Kane, M.A., F.E.S., which, for the fourth year in succession, still drags its weary way. In one way this "List" is most disappointing, for whilst the author goes out of his way and makes a long excursus on a species here and there, the forms of other species which are abundant in Ireland are almost neglected, necessitating, in reality, another list before the present one is finished. The *E. M. M.* has

been practically valueless this year to British lepidopterists; the paper "On the Life History of *Tinea vinculella*," by N. M. Richardson, B.A., F.E.S., together with a few odd scraps by Dr. Wood, and a life-history or two by Mr. Porritt, being all that one can cull of more than the mere "collecting-note" order. It is with regret that one has still to notice the printing of papers which make science absurd. One paper, "On the senses of Insects" (*Entom.*), stands unequalled in this direction. It is presented to the "lay mind," a form of aberration we had not previously heard of: evidently it is not due to an excess of scientific knowledge, or of prolonged study.

The larger societies are doing good work; the smaller ones (except the North London Society) appear, this year, to have suuk into comparative obscurity. The Entomological Society of London has now very successful and interesting meetings, and appears full of vigour, a great contrast to the "dry as dust" period of—well, not many decades ago. It is now, undoubtedly, in touch with all that is best in British entomology, and its *Transactions* contain some highly interesting papers on British species. The *Transactions* are worth all the money one pays as an annual subscription, and again we would appeal to entomologists in the country to join this society. We cannot expect to keep up the high ratio, but the *Record's* appeal has been responsible, during the last two years, for quite a third of the new Fellows who have joined the Society, and we would again ask would-be Fellows to communicate with us. The City of London Society, from a scientific point of view, is easily second; its discussions, papers, etc., being of a high standard of excellence; and with such papers as those read by Messrs. Prout, Bacot, Hanbury and Dr. Buckell, need fear no comparison. The South London Entomological Society is a society where old-fashioned notions, rather than science, are still largely in vogue. It is, moreover, a champion society for promises, but it lacks the virtue of the fulfilment thereof. In February, 1895, the secretaries issued a notice to the effect that papers were promised to be read by Messrs. Billups, Tutt, Robson, Step, Mansbridge, South, Hewett, etc. As the promises have been fulfilled, we have deleted the names in our "Societies" list, but we find that very few names are, even now, absent from that list; the remainder have never attempted to redeem their pledges, and members have probably attended meeting after meeting, expecting, in vain, that the promises would be kept. The Provincial Societies are not very active, from a scientific point of view. The members appear to meet and exhibit their captures, but we hear of little else. We cannot even refer to a single scientific paper that has emanated from the Liverpool, Birmingham, York or Leicester\* Societies this year. Perhaps this is due to our ignorance. At any rate, we would suggest to the officers that the essential value of a society is missed unless it fosters in its younger members a real scientific spirit, and unless the seniors show them, both by example and precept, that the exhibition of captures, although a very laudable object, is not all that a so-called scientific society should aspire to, and that there is no *raison d'être* for its existence as such, unless the scientific objects of the society

\* Since the above was in type we have received a copy of the Proceedings of the Leicester Society, which will be noticed in due course.—En.

are duly and continuously carried out. A society must set a high standard, even if it fail to quite reach it.

Of separate works there have been very few. Mr. Meyrick's is probably the book of the year. It is the strangest jumble of advanced views and retrograde movement that has ever been published. We have nothing but praise for the man who can step straight out of the old ruts, and produce a book which entirely uproots the treasured shibboleths of a school of entomologists, who were suckled on Newman and Stainton in their entomological babyhood, fed on Newman and Stainton in their youth, starved on Newman and Stainton in their manhood, and are still striving manfully to obtain nutriment from them in their old age. To such, if they see it, the book will be a revelation. But when one gets out of old ruts one must know that the new road is sound, and here our author is very doubtfully a trustworthy guide. The lines on which a new scheme of classification wants formulating must be compounded of the work done by specialists in various lines of work—Comstock, Dyar, Packard, Kellogg, Scudder, Chapman and Hampson are to hand. Instead of availing himself of all the material possible, our author chooses a path of his own, and neglects all the special work. Needless to say, he often fails hopelessly. The unweildy genera revert largely to the time when all butterflies were *Papilio*, all moths with pectinated antennæ—*Bombyx*, all "Plumes"—*Alucita*, and so on. In fact, the genera often comprise impossible combinations, and show the author to be utterly ignorant of the early stages of most of our British species. The book in detail is an utter failure; yet in its broad aspects, we repeat again, that we have the greatest respect for the industry and pluck of the man who has produced it.

Another year is approaching. May 1896 be a red-letter year to all classes of lepidopterists.

## SCIENTIFIC NOTES AND OBSERVATIONS.

SECONDARY SEXUAL CHARACTERS: MALE TUFTS OF *XANTHIA AURAGO* AND *LEUCANIA LITHARGYRIA*.—At sugar here I took a moth very like *Xanthia aurago* in size, form and markings, but of a dull grey-brown colour with no yellow or orange tint, and with no fan-like appendage on the under surface of the body. The only typical *X. aurago* I have examined this season has a conspicuous red "fan" protruding among its legs (probably it has or had two such appendages). Can anyone tell me whether these "fans" are generic, specific or only sexual distinctions? Some specimens of what I believe to be *Leucania lithargyria* have black tufts somewhat similar, but not so fan-like.—F. NORGATE, 98, Queen's Road, Bury St. Edmunds. [Sexual characters.—Ed.].

THE HYBERNATING STAGE OF *DIANTHOECIA CAPSOPHILA*.—I cannot help feeling that in his remarks on the hibernating stage of *D. capsophila*, Mr. Kane has rather confused two distinct phenomena. Referring to his remarks thereon (*ante*, p. 55) he writes:—"Dianthoecia capsophila emerges indiscriminately from the end of April till the middle of August, and hibernates both in the pupal and occasionally in the larval stages." On two occasions I have had fairly large



consignments of the pupæ sent to me in September—once nearly seventy, on the other occasion above thirty—and, with the exception of an early emergence or two in the beginning of May, the others emerged most regularly in the first three weeks in June. Now, I would venture to suggest that, in common with the other species of this genus, a few larvæ of this species may feed up very rapidly, and emerge towards the end of July and in August, and that the individuals forming this partial second brood lay their eggs, the larvæ hatch, and feed up as rapidly as possible until the pupal stage is reached. It may be that winter sometimes overtakes them before they are full fed; but there is to my mind a considerable difference between larvæ going through the winter normally as such (*i.e.*, hibernating as larvæ), and larvæ doing their level best to reach the pupal stage by continuously feeding, and probably being exterminated if this stage be not reached in nature at a comparatively early period in the winter. I should be pleased to hear the views of those entomologists who have bred large numbers of this species, for probably there is no species more regularly bred, and therefore no species of which detailed information ought to be more readily obtained.—J. W. TUTT, Westcombe Hill. *November 14th, 1895.*

My experience of *D. capsophila* has been as follows:—I have bred the insect every season for a good many years past. I generally collect the larvæ from the pods of *Silene maritima*, about the end of June or beginning of July, and place them in flower-pots containing loose mould, which I cover over with muslin. The larvæ have fed up (on the flowers and in the pods) and pupated, the imagines appearing in the following season. One year, however, a number of the imagines emerged the same season, shortly after pupation (*vide.*, *Ent. Rec.*, vol. i., p. 262). When collecting the larvæ in July, 1894, I remember being much surprised at finding on one day a freshly emerged imago, a number of full-fed larvæ, and also a number of larvæ hardly an inch long. It struck me at the time as being curious, because the flowers of *S. maritima* were quite over, and the pods which were then remaining were hard and dry from the effects of the sun. The large larvæ pupated shortly after they were transferred to the pots, but the little ones (which I was obliged to feed on ragged robin, as I could not get flowers of *S. maritima*) stopped feeding soon after their removal, and buried themselves in the soil. I turned a few up in December to see how they were getting on, and found that they had become much lighter in colour. They lived until January, and then died, either from the effects of the intense cold (they were kept out of doors) or from some other cause unknown to me. This is the only instance I can give where (in my experience) the larvæ of *D. capsophila* have attempted to hibernate. The perfect insect appears here about the same time as *D. caesia*, *viz.*, the first week in June or, if it be an early season, the last week in May. The female deposits her eggs about dusk (9.30 to 10 p.m. in June) on the flowers of *S. maritima*, in the same manner as *D. caesia*, and the larvæ hatch in a week or ten days, and at once commence to eat their way into the young tender pods.—H. SHORTRIDGE CLARKE, F.E.S., Douglas, Isle of Man. *November 15th, 1895.*

I have bred *D. capsophila* now for a long time, and at various times of the summer. I think that, in some seasons, the larvæ

hibernate. This year I took the insect in fine condition, late in August. The larvæ from these could not feed up, as the plants of *S. maritima* were then getting scarce, and would be quite over before the larvæ could be full-fed. I have never, however, kept one of these late broods.—H. MURRAY, Lowbank Villa, Carnforth. November 15th, 1895.

Although I have bred a few specimens of *D. capsophila* nearly every year, I have never taken any *special* pains in the breeding of this species, because I could invariably take plenty with the net quite equal in condition to bred specimens. However, they appear to hibernate both in the pupal and larval state, depending mainly upon how the late larvæ are forced, etc. In its natural state there appears to be a succession of broods, extending from May to August, and in confinement we may obtain two broods by slight forcing. In the latter event I am of opinion that the second brood are lighter in colour, and have a nearer resemblance to *D. carpophaga*. I have observed at various times that *odd* specimens, when *first caught*, have a very dark appearance, and are nearly unicolorous; but this entirely disappears in a very short time, and the specimens become quite typical.—Geo. A. BOOTH, F.E.S., Preston. November 27th, 1895.

NOTES ON BREEDING AMPHIDASYS BETULARIA AND ITS VAR. DOUBLEDAYARIA.—After reading Mr. Douglas C. Bate's interesting paper on *Amphidasys betularia* (*ante*, p. 27, *et seq.*), I am tempted to pen a few notes on my own experience in breeding the species, and its variety *doubledayaria*, last summer. Both parents, and two of the three grandparents whose colour is known (the fourth, a wild male, never came under observation), of the eggs that I received from a friend, were black, but of the moths that resulted, and which emerged between June 2nd and 27th, about two-thirds were *doubledayaria*, and the rest typical. In Mr. Bate's brood the males, as a rule, came out first and the females later, but, curiously enough, with mine the reverse was the case, for the first fourteen moths that emerged were all females, and out of the next six only two were males; after that, both sexes came out together for a time, whilst of the rearguard of the brood the males formed rather the majority. Emergence took place, as a rule, in the late evening or at night, chiefly from about 7 to 11 p.m., and, owing to this, it frequently happened that the moths were not in a fit condition to put into the killing-box before one retired to bed, but as it was invariably the case that those, whether males or females, that were left in the cages all night were so rubbed by the morning as to be worthless, I only set out about 70. Var. *doubledayaria*, like several other black moths, gets shabby-looking very easily; its scales seem to be remarkably loose, so that great care is necessary in setting it, and, owing to its colour, the loss of any of them at once catches the eye and spoils the appearance of the wing. The larvæ, which showed a great range of colour between green and smoky brown, were fed throughout on alder; some pupated in the soil, whilst others did not take the trouble to do so, but turned to pupæ on the surface. Pairings were easily obtained, and plenty of eggs, which are very small for so large a moth, were laid; for a single female will produce them by the hundred, pushing her ovipositor through the meshes of the turlatan, and laying her eggs on the opposite side of it from that on which she is resting. Mr. Bate's careful observations leave nothing

more for me to add.—EUSTACE R. BANKES, M.A., F.E.S., The Rectory, Corfe Castle. November 16th, 1895.

## NOTES ON COLLECTING, Etc.

### Coleoptera at Ipswich in 1895.

By CLAUDE MORLEY, F.E.S.

(Concluded from p. 155).

*Copris lunaris* rather surprised me by being in a street lamp, although, of course, it is allied to *Odontaeus*, and I have also seen *Gentropes stercorarius* at light. Besides *Copris*, *Aphodius merdarius*, *Oxyomus porcatus* and *Trox scabulosus* are the only LAMELLICORNIA added. Of the STERNOXI I beat *Agrius laticornis* from honeysuckle in July, swept *Throscus dermestoides* from bracken, and took *Cryptohypnus 4-pustulatus* from *Sagittaria*. *Telephorus flavilabris* and *T. lituratus* were common in damp meadows, with *Malthodes dispar*, *Malachius aeneus* and *Dasytes plumbeus* on flowers, and *Neerobia violaceus* among bones in the woods. *Anobiium fulvicorne* was swept from alder, and *Xestobium tessellatum* dug from its burrows in a decaying willow. *Prionus coriarius* and *Leipus nebulosus* again turned up this year, together with *Rhagium inquisitor* and *Saperda carcharias*—of the latter two specimens, one at Bury St. Edmunds and one at Ipswich—for the first time. *S. populnea*, contrary to last year, swarmed in May.

Of the PHYTOPHAGA many very interesting things were secured. *Donacia affinis*, *D. sagittariae* from reeds, and *D. bidens* from *Sagittaria*, *Crioceris asparagi*, *Cryptocephalus 6-punctatus* (1) beaten from birch in May, *Chrysomela didymata* and *varians* swept in September. *Melasma longicollis* beaten from poplar, *Prasocuris beccabungae* and *Galeruca tenella* from water-weeds, were all taken more or less commonly. *Longitarsus anchusae*, *L. atricollis*, *L. laevis*, *L. tenebris*, *L. nasturtii*, *Haltica ericeti*, *Aphthona lutescens* and *A. coerulea*, *Bathypila aerata*, *Apteropoda graminis*, *Hippuriphila modeeri*, and *Psylliodes chalconera* were all swept. The very few HETEROMERA added included *Gnathocerus cornutus* in a loaf of bread, *Hypophloeus bicolor* possibly attracted by the treacle tin, *Conopalpus testaceus* beaten from poplar, *Mordellistena abdominalis* and *M. pumila*, *Anaspis subtestacea* and *Anthicus floralis* from flowers. The last-named species appears also to be attracted by dung. The RHYNCHOPHORA constitute a fairly long list of new species, particularly in the interesting genus *Apion*, which has been worked somewhat assiduously. *Caenopsis waltoni* from early moss, *Barynotus obscurus* swept, *Sitones crinitus* from reeds, *S. sulcifrons* from water, and *S. tibialis* swept from railway banks. *Liosoma ovatum*, common in hedgerows in April, *Orchestes avellanae*, *O. ruscii*, *O. stigma* and *Rhamphus flavicornis* all beaten from oak, &c., in May. *Eriirhinus acridulus* and *Bagous tempestivus* from aquatic plants. *Tychius tomentosus*, *Cionus blattariae*, *C. pulchellus* and *C. scrophulariae* all appeared upon the same day, and *C. verbasci* later. *Coeliodes fuliginosus* and *C. ruber*, *Ceuthorrhynchus assimilis*, *C. chalybaeus*, *C. contractus*, *C. cyanipennis*, *C. rugulosus* and *Ceuthorrhynchideus floralis*, which swarmed on *Nasturtium*; *Rhinoncus inconspicuous*, *R. perpendicularis* and *Gymnetron noctis* were swept, *Balaninus*

*villosus* and *B. tessellatus* from oak, *Hylastes palliatus* common in felled pines, and *Phloeophthorus rhododactylus* swept in grassy places near woods. Of *Apion* I have taken *A. aethiops*, *A. confluentis*, *A. difforme*, *A. erri*, *A. hookeri*, *A. loti*, *A. pisi*, *A. pubescens*, *A. radiolus*, *A. simile*, *A. tenue*, *A. trifolii*, *A. varipes*, *A. vorax* and *A. viciae*, all more or less commonly, and only through lack of previous working do they stand as additional species.

Since the above was written many additional species have turned up, either by collecting or among those already taken, but not previously examined. *Homalota vestita* from dead dogs in April; *Philonthus sanguinolentus* and *P. albipes* from dung in October; *Oxytelus laqueatus* and *Trogophloeas rivularis* on water in May; *Phloeobium clypeatum* was swept in October. *Eumicrus tarsatus*, *Meligethes brunnicornis*, *Agathidium nigrinum*, *Scymnus pygmaeus*, *Lycoperdina boristae* and *Brachypterus pubescens* were all swept. *Saprinus rugifrons* was in a dead hedgehog in April. *Malthinus fasciatus* occurred with *Dasytes plumbeus* in June. *Cis villosulus* was beaten from alder in September, and *Ptilinus pectinicornis* was taken from decayed willows in November. *Chrysomela lamina* again turned up this year in its old locality—a hedge twenty yards long. *Psylliodes affinis* occurred on reeds. *Sitones humeralis* was swept from *Vicia sativa* and *Erirrhinus festucae* and *Bagous* (? *diglyptus*) from aquatic plants, while *E. validirostris* is very abundant under aspen bark. *Cleonus sulcirostris* and *Apion carduorum* swept from thistles in November, and a couple of dozen *Hylesinus crenatus* from under oak bark on the 28th, complete the list.—Ipswich. December, 1895.

LOCAL LEPIDOPTERA AT FARNBORO'.—Last autumn I took a single specimen of *Xylina semibrunnea* at sugar, also one *Apamea ophiogramma*. I did not take any larvæ of *Plastenis subtusa* this year (1895), as I was too much occupied at the time to look for them, but last year (1894) I reared over seventy specimens, so that it was well to give them a rest. This year I only saw one *P. retusa*; that was on sugar, but I took nine good *Calymnia affinis*, half a dozen worn *Noctua stigmatica*, together with a good series of *Dyschorista suspecta*. There were very few *Asphalia diluta* on the sugar this autumn, and *Xanthia flavago* and *X. fulvago* were also chary as to appearing at the bait, although on some favourable nights they were exceedingly abundant on the grass-heads in a restricted area about 15 yards in extent, and with very few fallows near.—HOPE ALDERSON, Hilda Vale Road, Farnboro'. December, 1895.

SCOPARIA CRATAEGELLA AND S. MERCURELLA.—Both these species occur here, the former abundantly, varying a great deal in size, colour and intensity of markings, the latter very sparingly. The specimens of the latter, however, are all much darker than those of *S. crataegella*, especially between the first and second lines, giving a banded appearance.—W. S. RIDING, M.D., F.E.S., Bucherell Lodge, Honiton. November 8th, 1895.

THERISITIS MUCRONELLA AT IVY.—The cold (12° of frost) and wet spoilt our ivy early, and I have no fresh captures to record, except one *T. mucronella*.—IBID.

XYLINA CONFORMIS IN WESTMORELAND.—One autumn, about twelve years ago, I captured among many other insects at ivy a specimen of *X. conformis*, which Mr. Hodgkinson named for me, and which I

believe has not yet been recorded. I have no idea of the exact locality where the insect was captured, nor have I worked the ivy much, so that I have not since stumbled across it. In those early days I had placed it among *Epura nigræ*, which was very abundant that season.—H. MURRAY, Lowbank Villa, Carnforth. December 19th, 1895.

**SPHINX CONVULVULI IN HAMPSHIRE.**—Between August 11th and October 2nd sixteen specimens of *S. convulvuli* were taken by me at Christchurch, Hants.—A. DRUITT, Christchurch. November, 1895.

**LEUCANIA VITELLINA AT CHRISTCHURCH, HANTS.**—On October 3rd and 6th I took two specimens of this insect at sugar. The specimens are in fair condition.—IBID.

**DO EAST DEVON INSECTS EMERGE LATE?**—How is it that our insects in East Devon emerge a fortnight or three weeks later than in the Midlands, or even in Scotland? *Noctua glarea*, *N. castanea*, &c., are fully that time earlier in the North, and Major Robertson writes of taking *Poecilocampa populi* and *Asteroscopus sphinx* before October 15th, at Cheltenham. Last year (not exceptional) my first *A. sphinx* was taken on November 10th, and the first *P. populi* on November 19th, in perfect condition.—W. S. RIDING, M.D., F.E.S. November 8th, 1895.

**COMPARISON OF DATES OF APPEARANCE OF CERTAIN INSECTS IN DEVONSHIRE.**—*Asteroscopus sphinx* is about a fortnight later than usual here this year, my first having been taken during the night of November 5th–6th, when I had six males; since then I have taken the males plentifully, having as many as 51 in my traps on the morning of the 14th, the bulk in good condition. In 1893 my first *A. sphinx* occurred on October 20th, the first *P. populi* on November 23rd. *Hybernia defoliaria* and *H. aurantiaria* are also very late this year, owing, I suppose, to the cold spell at the end of October. Has anyone noticed the fact that in the case of *A. sphinx* one does not get any “heralds” or “forerunners,” but the species seems to burst out suddenly in numbers. In the case of most species I find a few stragglers appear some time in advance of the main body.—E. F. STUDD, M.A., B.C.L., F.E.S., Oxtou, nr. Exeter. November 18th, 1895.

**ERRATIC EMERGENCES OF PAPILIO MACHAON.**—In June, 1894, I was at Wicken, and found two eggs of *P. machaon*, which hatched, fed up and pupated in due course, and I expected them to emerge in the following August. However, they went over, and one emerged on July 6th of this year, a fine, averaged-sized specimen; the other is still alive, but shows no signs of emerging.

A batch of larvæ, from Wicken, July, 1894, have also been very erratic. One emerged on August 20th, 1894 (about the time when I expected them all), rather a small one. Others appeared on June 4th, July 3rd and September 29th of this year—the last being the largest of all. Several of the remaining pupæ are still alive, and will, I suppose, go over to 1896. Is this usual?—IBID.

### Notes of the Season.

**EXMOUTH, BABBACOMBE, BIDEFORD.**—After having a good season at home, I started for Devonshire on July 29th. I have had many a good day's sport there, and my hopes ran high; but, alas! I have but a sorry tale to tell. The first week was spent at Exmouth, where *Mesotype virgata* swarmed on the Warren, and *Stenia punctalis* was

fairly common. Through the kindness of a local entomologist I obtained three *Callimorpha hera*, but I was probably a little early for this species. It was, however, my best capture. Although Exmouth is a great locality for *Heliothis peltigera* and *Chariclea umbra*, I failed to find the larva of either species. August 3rd found me once more at Babbacombe, in my old haunts, but where were the insects? A week's work produced nine *Acontia luctuosa*, nine *Leucania putrescens*, and one each of *Lithosia caniola*, *Agrotis obelisca*, *A. lucerneæ*, *Calligenia miniata* and *Ilythia carnella*, all species that sometimes occur fairly abundantly at Torquay. Of other species, *Gnophos obscurata*, *Agrotis puta*, *Larentia olivata*, *Eupithecia subciliata*, *Endotricha flammealis*, etc., were fairly abundant. *E. subciliata* was a new species to me, and was confined to a very small area. This is a poor record, but everything was against us—rain, wind, and the advancing march of civilisation. This latter has quite destroyed a favourite haunt of *Cidaria picata*, and I fear is only too likely ere long to prove fatal to *A. luctuosa*. The favourite haunt of this locality was planted with barley, and consequently the poor results above mentioned. A friend of mine, however, dived in after this pretty species, and managed to get about thirty. The last week of my holiday was spent in North Devonshire; but I obtained nothing worth recording except the larvæ of *Agrotis ripae*, on the sandhills near Bideford.—(Rev.) E. C. DORRÉE Fox, M.A., Castile Moreton, Tewkesbury. October 21st, 1895.

CHURCH STRETTON, SALOP.—The season of 1895 has, on the whole, been a very good one in so far as this neighbourhood is concerned. Sallow-bloom in early spring was not, however, so productive as in 1894, and I got nothing worthy of note by working it. Later on, *Nemeophila plantaginis* turned up in goodly numbers; on the 29th of May I saw fifteen ab. *hospita*, but managed to get only two, owing to the nature of the ground, which is extremely hard to work. I did not meet with this insect again, though I visited the locality often, until the 4th of June, when I saw eight more, and captured one. This form of *N. plantaginis* seems to be getting commoner. In 1893 I found it for the first time in England, when I saw three only, and managed to get one; in 1894 I saw five, but obtained none. I secured a good series of *Luperina cespitis* by sweeping grass, from the middle to the end of May, for larvæ, which were then not rare. The young larva is light-green with white dorsal and sub-dorsal lines, but later on it becomes of a beautiful bronze colour, the lines being yellowish-white. In this coat it exactly agrees with Guenée's description of the larva of *Neuronia popularis*. *Cucullia umbratica* is, as a rule, far from common about here, but this year it proved an exception, and I managed to obtain a good series.

Sugar was of no avail here in the summer, but I contrived to get a lot of insects by visiting flowers, especially thistles and ragged-robin (*Lychnis flos-cuculi*), with a lantern at night. During June, *Plusia iota* and *P. pulchrina* were much commoner than usual, flying over pinks, etc. On the 26th of June I caught in company with these, a very fresh *P. interrogationis*, and obtained one more very good specimen on the 29th of the same month. This insect is far from common here, though a friend managed also to get two specimens. About the middle of July I was lucky in stumbling upon a good

locality for *Agrotis lucerneæ*—a very stony piece of ground at the foot of a hill, here called the “Devil’s Chair,” where the species was very common, though hard to net. Towards the middle of August I got a few specimens of *Lithomia solidaginis*, among heather, then in full bloom. On the 21st of August I found a full cocoon of *Cerura bicuspis*, for the first time on birch. This species occurs here not infrequently, but I have always taken it before on alder. In 1893 two friends and I got three larvæ feeding on this latter in one afternoon. I was fortunate enough to get four specimens of *Cirrhoedia cerampelina*, by searching at the foot of some very large ash-trees near here, on the 27th of August, and obtained one more two days later. All, without exception, were clinging to blades of grass, the trunks not affording a single specimen. I did not see the insect at all throughout September. During this latter month sugar produced rather good results; I got three *Xanthia gilvago* by this means; one more I bred from a larva got off elm. I have been unable to get the larva of the insect which I call *Anthocaris hesperidis*, though I have searched and swept for it.—F. B. NEWNHAM, M.A., Church Stretton, Salop. November 22nd, 1895.

## NOTES ON LIFE-HISTORIES, LARVÆ, &c.

NOTE ON THE LIFE-HISTORY OF *THECLA ROBORIS*, ESP.—As the life-history of this interesting species appears to be imperfectly known in this country, seeing that in the text books by Lang, Kirby and Kane the usual food plant is not given, a few notes on rearing it from the egg may be of interest. The eggs, which were found on stunted ash trees in the neighbourhood of Vernet-les-bains, in the Pyrénées Orientales, in July, 1894, are of a brownish-red colour, and in shape like a cone flattened at the top and rather deeply furrowed at the sides. They are deposited singly on the knotted branches of the most ill-favoured trees in the locality, frequently on the scar left by a last year’s leaf. About the middle of March last they were placed in a cool greenhouse, where the larvæ began to hatch on the 25th of that month. The young larvæ were immediately sleeved on a small ash tree grown in a pot, and kept in a greenhouse especially for the purpose, thus obviating the difficulty usually found in rearing larvæ on ash, which so quickly withers, and does not last well in water. Several small ichneumon flies emerged from some of the eggs about the same time; certainly far too soon for them to find eggs to attack. The young larva appears to be of a blackish colour, from the numerous black hairs with which it is covered, but it soon looks paler when, after feeding for a short time, the skin becomes visible. In the early stages the larvæ feed at all times, but after they were about half grown, they rested during the daytime, huddled up close together on the shady side of the stem of the ash, near the ground, and only left their retreat to feed at night. The full-fed larva has a purplish lateral stripe, and bears a strong generic resemblance to that of *T. quercus*. They began to pupate on the 2nd May, attaching themselves to a dead leaf, or to the sleeve by a silken girdle round the middle for the purpose, and the first imago emerged on the 15th of May, which is probably much earlier than the time at which the species appears anywhere in nature, as, having a holiday in view at

the end of May, I kept the larvæ and pupæ at a high temperature, in order that they might get through their transformations in time.

*T. roboris* is placed by Rambur in a distinct genus, *Loeosopsis*, distinguished from *Thecla* by the hairless eyes of the imago, and the absence of a tail and the "hair-streak." The markings of the under-side consist of a sub-marginal row of spots on all the wings, though much fainter on the fore-wings than on the hind-wings, recalling the so-called obsolete varieties of *Lycaena corydon*, *L. arion* and other species, and possibly more nearly approaching the primitive markings of the *Lycaenidae*. It occurs in several widely distant places in the south of Europe, but is considered a very local species.—W. E. NICHOLSON, F.E.S., Lewes. November 22nd, 1895.

PUPATION OF CALLIMORPHA HERA.—It seems to me unlikely that the fact that the larva of this species goes beneath the surface to pupate, will account, as suggested by Mr. Fenn, for any failure in rearing it, because it pupates equally well if not supplied with any soil, spinning up freely in a slight silken cocoon amongst the food and rubbish in the cages, and I know of large numbers having been reared successfully under such circumstances. It appears, however, to be generally, if not invariably the case, that a somewhat large percentage of moths bred in confinement, even from eggs laid by captured females, are more or less slightly crippled in one or both pairs of wings, and although the cause is not easy to understand, I hardly think it can be due to the absence of soil from the cages.—EUSTACE R. BANKES, M.A., F.E.S., The Rectory, Corfe Castle. November 1st, 1895.

## PRACTICAL HINTS.

SETTING AND PINNING INSECTS.—Would it not be possible to establish an universal method of "setting" and "pinning" insects? A long series looks so bad when specimens are taken from various collectors. Some set on round boards, others again prefer flat ones. With the pinning, again, some like a tilt backwards, others forwards, and so on. I wish something could be done to remedy this.—M. GUNNING, M.D., The Mall, Montrose, N.B. October 4th, 1895.

I am glad to see that Dr. Gunning has started the question of pinning. I often get insects, not merely from novices, but from old hands as well, that require re-pinning because the head of the pin has been directed so much backwards; I can never understand the *raison d'être*, for the pin at an acute angle with the cabinet cork can never hold well, and is constantly liable to fall and to damage other insects, as well as the one on it. I think the head of the pin should always be directed a little forwards, so that it forms a slightly obtuse (or right) angle with the cork, and can be firmly pressed in so as to hold the insect. When some insects are pinned in both ways in a series, much more room is necessarily taken (an important thing in a cabinet), besides the want of uniformity in appearance. As regards height, years ago, I remember, most insects were pinned to rest upon the paper, but that has two great disadvantages, it crushes the insect against the cork and damages it, and if it should grease makes the paper unsightly. Too high setting (like that of foreign insects), to my mind, looks awkward, besides the want of uniformity with the usual mode, as in most other things, I think the satisfactory plan is the middle one, where the lowest part of the body of the insect is



never sufficiently low to touch the cork. As regards flat setting, I tried it some years ago, but the insects did not look well, and I gave it up; besides it has this great disadvantage, that after a time the posterior border of the fore-wings frequently cockle up. Slightly curved boards seem to me the best, the curve being less for Geometers, as the wings of these seem in most cases to drop after a time, I suppose from our being unable to keep them long enough braced during busy times.—W. S. RIDING, M.D., F.E.S., Honiton. *November 1st, 1895.*

Uniformity of setting is much to be desired, but it seems to me to be impossible of attainment. It depends so much upon the individual. My rule is, as far as possible, to get the pin straight through the centre of the thorax, and sloping so slightly forwards, that when removed from the board the insect may slope slightly towards the front of the cabinet drawer, the pin being exactly upright. My boards are covered with lined paper. The lines act as guides to anyone with defective sight. I could wish that boards were sold covered with lined paper, but the very suggestion has been scorned by at least one dealer. I set the inner margin of the fore-wings, as far as possible, at right angles to the body, except where the great breadth of the fore-wings renders this out of the question, as in most Geometers. Two braces at least are wanted to each wing, and pins to support the body in its proper position. Such is my theory, but we all know how disappointing is the result of examination after removal from the boards. The dropping of the wings is (I have to thank Dr. Buckell for the suggestion) generally brought about by neglect to see that the bases of the wings rest upon the shoulder of the board; thus the base of the wing will dry at a different angle from that of the part of the wing braced down, with the result that, when the insects are removed from the board, the outer parts of the wing are compelled to take the angle at which the base has become fixed.—(Rev.) C. R. N. BURROWS, Rainham. *November 6th, 1895.*

Mr. Burrows' remarks about "setting" and "pinning" are most valuable. I rarely use more than one brace on each side, placed as near as possible to the apex of the wings. What I aim at is to get a gradual and even slope from base to apex and to prevent any cockling up of the apex outside the brace, a very common tendency, especially with Geometers. I always find pinning the chief difficulty; an insect well pinned is more than half set, and it is impossible to set well one badly pinned.—E. F. STUDD, M.A., B.C.L., F.E.S., Oxtou, near Exeter. *November 15th, 1895.*

I see that Dr. Riding quite agrees with me as to the tilting forwards slightly of the pin. Another point which has always struck me is that dealers generally do not give a wide enough groove in their setting boards, so that the body of an insect cannot be properly pinned inside the groove. I always take a setting board a great deal broader than the insect to be set; for instance, in the case of a small Noctuid like *Noctua glaucosa*, I use a 3-inch board; this gives the proper curve, and the groove in the board comfortably holds the body of the insect. There are many setters who leave a great angle between the fore and hind wings, and this I think always looks bad, so that I always bring the lower wing well up under the upper one.—MONTAGU GUNNING, M.D., The Mall, Montrose, N.B.—*November 25th, 1895.*

## CURRENT NOTES.

Mr. W. H. B. Fletcher found cases of *Frumea betulina* in the New Forest, from which imagines of both sexes have been bred. According to Mr. C. G. Barrett (*E.M.M.*, Dec.), the fore-wings of the male are neatly, though very obscurely, reticulated all over with faintly blacker cross lines, and a large slightly blacker spot shows itself at the end of the discal cell. The cases were blackish, moderately erect, slightly constricted at each end, and with minute bits of dead leaf or bark scattered over the surface.

Mr. B. A. Bower differentiates *Scoparia basistrigalis* from *S. ambigualis*. We assume this to have become necessary now that Mr. Meyrick has telescoped both *S. ulmella* and *S. basistrigalis* into *S. ambigualis*, a proceeding with which we entirely disagree.

Mr. C. Oldham records (*Naturalist*, Dec.), the capture of two specimens of *Cosmia palearea* on Risley Moss, near Warrington, in August, 1894.

Mr. R. H. Meade states (*Naturalist*, Dec.) that he found a single male of the rare Dipteron, *Cynomyia alpina*, at Silverdale, in August last.

Mr. C. G. Barrett reports (*E.M.M.*, Dec.), that he has had larvæ of *Teras contaminana* sent to him from Southampton, which were feeding on the fruit of the apricot.

Mr. A. B. Farn announces (*E.M.M.*, Dec.), the breeding by Messrs. J. and W. Davis, of Dartford, of hybrids from a pairing of *Eugonia autumnaria* (♂) and *E. quercinaria* (♀). The shape and manner of depositing of the eggs suggest that there is a much closer relationship between these two species than between either of them and the other British representatives of the genus.

From larvæ of *Nemeobius lucina*, obtained on June 3rd, Mr. Walter A. Pearce records (*Entom.*, Dec.), that he bred an imago on November 7th, and a friend two others on October 20th and November 3rd. All were females. The pupæ had been kept out of doors.

Considerably over £300 was produced by the sale of Mr. W. H. Tugwell's collection, including the Butterflies, SPHINGIDES, BOMBYCIDES, NOCTUIDES and the larger INCOMPLETEÆ. The GEOMETRIDES, PYRALIDES, &c., have not yet been disposed of. The most important lots were as follows:—*Anosia archippus*, 35/-; *Argynnis lathonia*, 34/- for four specimens; variety of *Argynnis adippe*, 20/-; variety of *A. selene*, 50/-; *Euranessa antiopa*, 18/- and 16/- each; *Chrysophanus dispar* fetched for successive specimens, 45/-, 55/-, 63/-, 100/-, 147/-, 70/-, 45/-, 120/-; 25/- for a var. of *C. phloeas* with one white wing; whilst *Lycaena aris* fetched 35/- and 30/- per pair respectively. *L. arion* averaged 8/- per pair, *Deilephila celerio* 36/-, whilst again the Sesiids fetched higher prices: *Sesia scoliaeformis* and *S. speyiformis* averaged about 2/6 apiece, but some Irish specimens of the former went at as much as 7/-. The Zygenids, which were especially fine and variable, produced 35/-, 55/-, 42/-, 50/-, 84/-, 65/- per lot respectively, whilst a belated *Syntomis phegea*, said to have been taken by a Mr. Batchelor, produced £3. The Nolas, too, fetched high prices, whilst *Detiopia pulchella* went at 11/- and 30/- each respectively. One var. of *Arctia caia* produced 95/-. A special lot of 7 of the very dark Moray *Spilosoma menthastri*, and 8 extreme vars. of *S. lubricipeda*, with black vars. of *Liparis monacha*, went at about 35/- per lot of 30. One *S. menthastri* var. *radiata* produced £3, whilst *Laelia caenosa* went for 12/-, 12/-, 18/- per pair, and 16/- for one fine female. *Lasiocampa ilicifolia* fetched 32/6, 37/6,

47/6 each, and *Drepana harpagula* 35/-, 32/6, 32/6 for 3, with *Cerura bicuspis* at 30/-, 27/6, 27/6 for 3. *Leucania ritellina* produced 22/- and 26/- each, and *L. albipuncta* 30/- and 28/- per pair, whilst *Nonagria concolor* came down to 18/- for 4, and *Xylomyges conspicularis* produced about 8/- each. *Laphygma exigua* produced £1 apiece, *Hydrilla palustris* £1, whilst a pair of *Agrotis subrosca* went for £1, and *Orrhodia erythrocephala* 12/- each. *Luperina barrettii* produced about 28/- per pair; £2 15s. for a single *Cucullia graphalii*, and £4 15s. for an *Ophiodes lunaris*. These are the chief records of the day's sale, which was in every way a most satisfactory one. We need not add that almost every insect was specially labelled. The rest of the collection is to be disposed of on the 20th inst.

## REVIEWS AND NOTICES OF BOOKS.

BRITISH AND EUROPEAN BUTTERFLIES AND MOTHS (MACRO-LEPIDOPTERA).—By A. W. Keppel, F.L.S., F.E.S., and W. E. Kirby, L.S.A., with 30 coloured plates.—[Pubd. by E. Nister.] This is a rather handsome quarto, made in Germany, which is to be commended for its general accuracy and really excellent plates, of which 12 are devoted to butterflies, 4 to SPHINGIDES, 6 to BOMBYCIDES, leaving 6 for NOCTUIDES, and 2 for GEOMETRIDES. It devotes from 30 to 300 words to a species, generally 80 or 90, much in the style of Newman's Moths. It does not, however, include even all the English species, still less all the European, so that we can imagine its being, on occasions, very disappointing. The classification is of a good old crusted character, a blemish, however, which it enjoys in common with Barrett's more ambitious work, still this would prevent our recommending it to the tyro, yet, unless it is intended for the young collector with plenty of pocket money, we hardly see the precise role it is intended to fill.

THE CAMBRIDGE NATURAL HISTORY (Vol. v.)—PERIPATUS by Adam Sedgwick, M.A., F.R.S., and MYRIAPODS by F. G. Sinclair, M.A.—INSECTS.—Part I., Introduction, Aptera, Orthoptera, Neuroptera, and a portion of Hymenoptera (Sessiliventres and Parasitica) by David Sharp, M.A., M.D., F.R.S. [Published by MacMillan & Co., 17/6 net]. This volume does not deal with the more popular Orders of insects, and may on that account beat first sight less attractive to entomologists than the succeeding one. Inasmuch, however, as it treats of those Orders that usually receive less attention, and contains an introduction dealing with anatomy, embryology and metamorphosis, as well as an account of two lower classes leading up to the Insecta, we suggest that it ought to be the more welcome, as supplying that general knowledge of insects and an outline of their Orders, that it is so desirable that the student of any one section of insect life should possess, whilst it is not perhaps too technical for the general student, or even in some degree for the general reader. It takes a place that has not hitherto been adequately filled, if we can, indeed, say that it has been occupied at all by any English work since Westwood's *Introduction*, a work that must still keep its place amongst our books of reference, though, by the lapse of 56 years, it is in some respects out of date. Packard's *Guide* and Comstock's more recent *Introduction* are more nearly of the same class, but neither is by any means so full, whilst both have a distinctly transatlantic tone, especially in the species selected to illustrate their several families. The structures and anatomy of insects occupy two chapters (60 pp.) embryology and metamorphosis one chapter of 28 pp.,

and classification (of the Orders) is discussed in 9 pp. The classification adopted is a simple one, and the reasons for adopting it in such a work in preference to more elaborate ones appears to be, on the whole, satisfactory, something of the nature and value of other systems being indicated. Nine orders are given, which include *Aptera* (*Thysanura*) and *Thysanoptera*, as well as the traditional seven. Though alluded to, we think the fact that *Aptera* are hardly insects, in much the same sense that Skippers are hardly butterflies, is not made sufficiently clear; whilst *Thysanoptera* might have been merged in *Hemiptera*, almost as well as some of the other minor orders are merged in the rest. The chief aim of the book appears to be to give an account of all the families, and, when sufficiently important, of the sub-families; and so far as we are able to judge a very sound discretion has been exercised as to the amount of space allotted to the several families, in accordance with their interest and importance. No doubt one would like a fuller account, and a notice of more species not unfrequently; but this, like most of the other faults we could find, might be classified under the head of wishing the volume were twice as long. When not giving directly his own material, the author appears to have followed thoroughly trustworthy authorities, and if he has made any serious mistakes and oversights, they are in connection with subjects of which we do not pretend to be encyclopædic enough to happen to be familiar. So far as we have tested the book in subjects with which we are more or less competent to deal, the matter appears to be not only accurate, but well selected to convey what is required, without going into unnecessary detail. The figures, with hardly an exception, are really good; in many cases they are original, in others good authorities at first hand. They number nearly 400. In other respects—type, paper, &c.—the book is well got up. It is a work that we can recommend without reserve, either to the specialist who may wish to know something of other groups than his favourite one, or to the general student who wishes to obtain a clear knowledge of the insect world. And if the next volume equals the present we may congratulate ourselves on an important gap in English entomological literature being filled.

---

## SOCIETIES.

THE ENTOMOLOGICAL SOCIETY OF LONDON met on December 4th, 1895. Mr. G. T. Porritt exhibited an example of *Halesus guttatipennis*, taken at Lye, Worcestershire, in November, 1889. It was believed to be the third British example. Mr. Porritt also exhibited a series of *Naenia typica*, showing a curious malformation in all the specimens. He stated that about one-third of a large brood had emerged in exactly the same form, having the wings only half developed in point of length, but being almost normal as to width; the markings, however, were clearly defined. Mr. Tutt and Mr. McLachlan referred respectively to similar malformations in *Agrotis tritici* and *Hadena trifolii* (*chenopodii*), Mr. Tutt further remarking that Mr. Percy Russ, of Sligo, on one occasion bred or captured a number of *Agrotis cursoria* exhibiting a parallel malformation. Mr. Goss read a communication from Mr. Sidney Crompton, of Salamanca, Tenerife, announcing the capture there, by Mr. Hammerton, of two specimens of *Diadema misippus*, a species of butterfly not previously recorded from Tenerife. Mr. Crompton said the

specimens were in such fine condition that they must have been introduced into Tenerife in the larval or pupal state and emerged there. Mr. Tutt stated that he had received specimens from Captain Ellis, which had been taken in the Atlantic Ocean, many miles from the nearest land, evidently migrating at the time. The specimens consisted of males, and two forms of females. Mr. Hampson added that this was an addition to the fauna of the district where the specimens were captured.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY met on November 28th.—Mr. R. Adkin exhibited a specimen of *Mesogona acetosellae*, Fb., a species new to Britain. It was taken on October 26th, near Brighton. Mr. Carrington: four xanthic specimens of *Epinephele janira*, L., from Leigh, Essex, taken in the same field in 1890-91; also typical lemon-coloured forms of *Thymelicus lineola* from Shoeburyness. Mr. Henry J. Turner: a specimen of the moorland form of *Noctua festiva*, from Carlisle; *Crambus pinellus*, from Box Hill; a very rosy specimen of *Anticlea rubidata*, bred, from Chichester; and a pair of *Coccyx cosmophorana*, from Carlisle. A long discussion took place on the life-history of this latter species. Mr. McArthur had bred a number from the knobs produced by *Retinia resinella*, a year after they had emerged, and said that he found the larvæ in the frass of this species. It was not found at Rannoch, but had been recorded from several localities where *R. resinella* was not known to occur. Mr. Ashdown: a bred specimen of *Acronycta alni*, from Richmond, and a specimen of *Eumenes coarctata*. Mr. Briggs: an Orthopteron, *Periplaneta australasiae*, taken at Kew, and new to Britain.—On December 12th, 1895, Mr. Barrett exhibited on behalf of Mr. Brooks, of Rotherham, a long bred series of *Boarmia repandata*, including black forms, and forms having the dark markings intensified but not extended; a series of the grey form of *Tephrosia biundularia*, both from Rotherham; and a large number of specimens of Lepidoptera, collected near Lake Tanganyika, from November, 1892, to February, 1898, including two recently-named species, viz.:—*Pseudospiris paidiformis* and *Sapaea trimeni*. Mr. Carpenter: *Taeniocampa munda*, *T. gothica*, *T. stabilis*, *T. incerta*, *T. pulverulenta*, *Pachnobia rubricosa*, and red *T. gracilis*, taken at swallow-bloom in his own garden at Streatham. Colonel Partridge: a nearly pure white *Cucullia absynthii*, bred at Portland. Mr. Barrett, on behalf of Dr. Mason, a number of extreme varieties of Lepidoptera, including *Agrotis segetum*, uniformly pale and destitute of markings, a unicolorous *A. corticea*, a dark suffused *Acronycta alni*, an unicolorous pale *Noctua augur*, extreme dark and light forms of *A. lucerneae*, *A. simulans*, *A. agathina* and *Psilophora plumigera*, a pair of *A. var. subgothica*, and a very large *Noctua subrosea*. Mr. Adkin: specimens of *Hydraecia micacea* from W. Meath, similar in depth of colour to *H. petasitis*, and also a small *Agrotis saucia*, having purplish-grey primaries and black-outlined stigmata. Mr. Tunaley: a var. of *Lycaena corydon*, with a wide black border, and another with the black border absent, both from Freshwater; specimens of *Asilus crabroniformis*, with *L. icarus* impaled on their lancets; and a series of *L. corydon*, remarkable for the tendency to angularity in the hind-wings, taken at Freshwater; also specimens of *L. bellargus* and *L. icarus*, showing the same tendency, and contributed notes on the peculiarity. Mr. Winkley, on behalf of Mr. Montgomery; a large number of recently-bred *Colias edusa*.

# The Entomologist's Record

## AND

## JOURNAL OF VARIATION.

---

VOL. VII. No. 8.

FEBRUARY 1st, 1896.

---

### *Acidalia dilutaria* Hb. (holosericata, Dup.) as a British Insect.

By G. C. GRIFFITHS, F.Z.S., F.E.S.

It has been suggested by Mr. Tutt that it might be of interest if Mr. Prout's valuable paper on the "Identification of *Acidalia dilutaria*, Hb.," were followed by a note on the insect, as it appears in its chief British locality.

The species was first included in the British fauna in Doubleday's *Synonymic List*, 1st edition, p. 19, and a record of its capture in the neighbourhood of Bristol, by Mr. Sircom, is to be found in the *Zoologist* for 1851, p. 3,288.

Although the great majority of captures of this species have taken place in this district, there are a few records of its occurrence elsewhere. Respecting one of these, at Thetford, Norfolk, Mr. C. G. Barrett, to whom I wrote, has kindly informed me that the one specimen captured there was taken by the Rev. Henry Williams, in whose collection he examined it, and that he was fully satisfied of its identity with *holosericata* before including it in the list of Norfolk Lepidoptera. Mr. Barrett also tells me that he has heard of captures of this species by Rev. J. S. St. John, at Chalfont St. Peter. In the *Ent. Record*, vol. i., p. 289, is also a record, by Miss Kimber, of its occurrence at Newbury.

The larva of this species, under the name of *A. holosericata*, was first described by Rev. John Hellins in the *Ent. Mo. Mag.*, Sept., 1868. He says that ova were supplied to him by Mr. A. E. Hudd for three years in succession, until, on the third attempt, he was successful in breeding the species. The larvæ hatched on 25th July, and fed upon rock-rose (*Helianthemum vulgare*), and their habit was to congregate three or four together, near the bottom of a shoot, strip it for some distance of the bark or skin, and then feed on the withered leaves at the tip of the shoot as it hung down. They ceased feeding during the winter, and were at all times very sluggish. They moulted for the last time about the end of March, spun up during May, and the moth appeared from June 20th to 29th. He describes the larvæ as being a little over half an inch in length, and as having their skin most wonderfully wrinkled and warted. Mr. George Harding informs me that he has on more than one occasion bred this species, and describes the hybernating larva as standing straight out from the stem on which it rests, thus resembling a small dried twig.

The head-quarters of *A. holosericata* is upon a steep slope of

Durdham Down, facing the picturesque Avon Gorge, of which Bristolians are so justly proud; but I am informed by my friend Mr. R. M. Prideaux that in 1892 he found a few on the rocky slopes under Observatory Hill, Clifton Down. There is also a record in Mr. Hudd's *List of the Lepidoptera of the Bristol District*, that a few stragglers have been taken on Leigh Down, on the Somerset side of the Avon, having probably been, as Mr. Hudd suggests, blown across the river.

In the favourite haunt of this very local species, *A. holosericata* may be found abundantly during about a fortnight in the summer. Mr. Prideaux records it from the 21st June to 5th July. In the summer of 1895 it must have emerged early, like many other species. I was unable to visit the locality until 28th June, and though I found the species still flying, nearly all the specimens were hopelessly rubbed and tattered, the long fringes of the wings soon becoming the worse for wear.

The moths may be started during the day from the grass or low bushes of privet, etc., where they rest with wings outstretched, but fly with a short and rather weak flight during the dusk of the summer evening. Up to the present time the species seems to keep up its numbers, and the steep slopes which it loves are certainly a safeguard to its existence, but so many species have either disappeared entirely from Durdham Down, or are deplorably reduced in numbers, that I cannot help feeling that for this species, with so restricted a habitat, the prospect of survival is somewhat doubtful.

*A. holosericata* seems to be but little subject to variation. I have never taken anything which could be dignified with the name of a variety. Of some twenty specimens now in my possession, four show very faint traces of a central spot in the fore-wings, and one is of a more leaden colour than the rest, this being one of the unspotted type.

In the above note I have continued to use the well-known name of *holosericata*, as I gather from Mr. Prout's paper that he considers our British examples a specialised local race, in view of which it may be well to retain for them the name *holosericata*, even if we only attach to it a varietal value.

---

### Probable specific identity of *Sciaphila penziana* and *S. colquhounana*.

By J. W. TUTT, F.E.S.

In the course of my wanderings among the mountains of Piedmont and the Tyrol I have often come across various insects which might be considered either *S. penziana* or *S. colquhounana*. This year, thanks to the kindness of Messrs. Wylie and J. J. F. X. King, I have added a long series of specimens known by the latter name to my collection. The variation therein increased my doubt as to whether we had really two species under the above name. As is usual in any case of doubt in matters of this kind, I wrote to Mr. J. Hartley Durrant, and was a little surprised to find that he was inclined to agree that the latter might be only a *foncé* variety of the former, but that, like myself, he had as yet an open mind on the subject. He further sent me the original descriptions of the *sci-disant* species,

The original description of *penziana* is as follows:—" *Tortrix penziana*, alis albis fusco-irroratis; fasciis tribus obliquis articulatis nigris. Caput album, hirtum. Palpi compressi, clavati, albi. Habitat in Sueciæ meridionalibus Provinciis." Becklin further writes: "Alæ anticæ, obtusæ, supra albæ lineolis fuscis irroratæ; fasciæ tres obliquæ, atræ, subarticulatæ articulis quadratis. Subtus fusca, immaculatæ, ciliatæ. Alæ posticæ supra fusca, subtus albidæ; margine exteriori fusco-maculato" [Becklin, in Thunberg's *Dissertationes*, iii., 56-7 (43), Plate v., fig. 1 (1791)]. *Penziana* was adopted by Hübner [*Eur. Schmect.*, xiv., 85 (1799)]. It appears also to be the *Nephodesme conspersana*, Schiff., *Vers. Tort. E.*, 14. Curtis named our whitest form *bellana*, evidently ignorant of Thunberg's description; Stephens [*Zool.*, 2755-7 (1850)] makes *bellana*, Curt., a synonym of *penziana* (Beck.) Thunb., but says that Hübner's *penziana* does not accord with Thunberg's. Stainton gives as characters of *penziana*: "h.-w. whitish (a variety occurs in which the f.-w. are much suffused with grey)." The bracketed portion refers undoubtedly to the form known later as *colquhounana*. *Sciaphila colquhounana*, Sta., Doubleday [*Cat.* (2nd Edn.), 23 (1866)] was first described under the name it now bears by C. G. Barrett [*Ent. Mo. Mag.*, xx., p. 244 (1884)], where he writes:—" *Colquhounana*, Hy.-Dblday., *Catal.*—Closely allied to the last species (*penziana*, Wlkn.) is a handsome form which has stood in lists and collections for many years under this name. Its size and measurements are almost exactly the same as those of *bellana*, but the dorsal margin of the fore-wings is not so straight, making the wing a little broader near the base, and not so sharply wedge-shaped. It is a handsome species, ground colour of the fore-wings slate-grey, varying much in intensity, and occasionally whitish in the central area. Markings of the usual fasciæ much like those of *bellana*, but slightly more oblique, and not nearly so sharply defined. Hind-wings whitish, tinged with grey at the margins. Head and thorax of the same shade as the fore-wings. The late Mr. Allis, writing in 1868, told me that he believed it to be distinct (from *bellana*, Curt.), that it 'occurred in lower ground than that species.' It is, in fact, like *conspersana*, an inhabitant of sea-side rocky localities, taking the place of that species on the more north-western coast. It is tolerably common in such places near Dublin and the Isle of Man. Mr. Hodgkinson asserts that it was reared by Mr. Gregson on the roots of 'sea-pink.' "

Now if from the above we select the scraps on which the specific distinctness of *colquhounana* has been based, they appear to amount to the following:—

1. "The dorsal margin of the fore-wings is not so straight."
2. "The usual fasciæ are slightly more oblique."
3. "The fasciæ are not nearly so sharply defined."
4. It is "an inhabitant of sea-side rocky localities."

We may take these *seriatim*: (1). I can say positively that there is not a scrap of evidence in a long series to support the assertion. The shape of the wings, on the whole, is identical in both forms, although there may be in both a slight individual variation. (2). The fasciæ are identical, they commence in exactly the same positions on the costa, and end in exactly the same positions on the outer and inner margins. Even the minor basal, apical and costal spots are identical.



(3). The best marked specimens from Unst and Perth show equally well defined fasciæ with *penziana*, in fact, the basal fascia is in them often more distinctly defined, and fulfils better than many specimens of the *penziana* form Stainton's emphasised diagnosis, "the outer edge of the basal patch forms an angulated fascia, reaching to the inner margin." (4). "It is an inhabitant of sea-side localities," Mr. Barrett considers. This may be, but it is no more confined to them than is *penziana*, unless Kinnoull Hill in Perthshire, the Cogne Valley in Piedmont, and the Val d'Ampezzo in the Tyrol, are to be so considered. In the Cogne Valley, at 7,000 ft. elevation, I found both forms side by side on the same rocks. Of the Unst specimens, Mr. King writes:—"The moths varied considerably, some specimens being almost white with dull markings, while others were almost of an unicolorous dark leaden-blue with the markings just discernible."

There appear to be three distinct forms of the species:—

1. Ground colour pure white, with distinct fasciæ, although but little irrorated with black dots = *bellana*, Curt. [In my collection from various British localities, Cogne Valley, Mendel Pass, Val Bigottina].

2. Ground colour pure white, with equally distinct fasciæ, but thickly irrorated with black dots = *penziana*, Becklin. [Perth, Unst, Val d'Ampezzo].

3. Ground colour dark grey, absorbing irrorations, but fasciæ distinct = *colquhounana*, Sta. (MS.), Barrt. [Kincardine, Unst, Cogne Valley]

3a. Ground colour very dark, almost unicolorous leaden-grey or leaden-blue, largely absorbing fasciæ. [Unst].

Summarising, therefore, we get the intermediate form (2) as the type (earliest described form), and the synonymy appears to work out as follows:—

*Penziana* (Beckl.), Thunb., *Diss.*, iii, pp. 56-7, Pl. v., fig. 1 (1791); [(?) Hübner, *Tortr.*, 85 (1799); Hübner, *Verz. bek. Schm.*, 390 (1826)]; St., *Zool.*, 2755-7; Sta., *Man.*, ii, p. 259; Wilk., *Tortr.*, p. 256. *Conspersana*, Schiff., *Verz. Tort. F.*, 14. *Bellana*, Curt., *Br. Ent.*, pl. 100; Barr., *Ent. Mo. Mag.*, xx, p. 244; Meyr., *Brit. Lep.*, p. 540. *Colquhounana*, Sta. (MS.); Dbl., *Cat.*, 2nd Edition., 23 (1866), Barr., *Ent. Mo. Mag.*, xx, 244 (1884).

Barrett (*E.M.M.*, xx, p. 244) is puzzling. He received a single specimen of a species, captured in the Alps, from Mons. Ragonot, which he considered was not *penziana*, but which agreed fairly well with Hübner's figure. He also discovered that Mr. Doubleday "heard many years ago," from Dr. Wocke, that this figure did not represent *penziana*; therefore he sinks Becklin's (not Hübner's) name (1791) for *bellana*, Curt., the reason for which is certainly not clear.

Taking the varietal forms into account, we get the following:—

*Penziana*, Thunb. (Beckl.), Hb. (?), Sta. (in part).

a. var. *bellana*, Curt., Sta. (in part), Barr. (in part).

b. var. *colquhounana*, Sta. (MS.), Dbl., *List* (2nd Edn.), Barr.

c. ab. *suffusa*, n. ab. [Extremely dark form of var. *colquhounana*].

Wilkinson, I observe, who evidently knew both the pale and dark forms intimately, correctly refers the species to *penziana*, Thunb., and says of the two forms known to him: "In the typical insect (*vide.*, Curt., *Brit. Ent.*, pl. 100) the ground-colour is white. There is a beautiful variety taken plenteously by Dr. Colquhoun, at Ardrossan, which has the ground-colour grey, but the markings are the same."

Mr. Horne, who has kindly sent me two very typical specimens of what he terms *penziana* and *colquhounana*, both correctly named, and representing the white *bellana* and dark *colquhounana* forms, writes:—"It is quite possible that these are one and the same species; both occur at the same time of the year. The great contrast in the nature

of the localities where they are found would account in a great measure for the difference in the colour of the fore-wings (I notice that the colour of the hind-wings of both is identical). I find *S. penziana* resting on a weather-bleached paling in Glen Derry, at an altitude of nearly 2,000 feet; *S. colquhounana* occurs on the dark rocks of the Kincardineshire coast."

The reference to the larva having been reared on "sea-pink" by Mr. Gregson, should be carefully compared with the remarks made by Mr. J. J. F. X. King (*E. M. M.*, vol. vii. (1896), p. 8). He writes:—"The larvæ seem to feed on the lichen which covers the rocks; we found (in Unst) many of the long silken tubes with the pupa-cases sticking out."

We should be glad to hear from Mr. Barrett, or any other entomologist, the present evidence on the other side. We observe with considerable astonishment that Meyrick uses *bellana* for *penziana* in *Brit. Lepidop.*, p. 540.

## SCIENTIFIC NOTES AND OBSERVATIONS.

**EUPITHECIA SUCCENTURIATA AND E. SUBFULVATA.**—With respect to the doubts that have been raised in the *Record* as to the distinctness of these species, I think further investigation will show them to be so in every stage. I have bred *E. subfulvata* in large numbers for the last dozen years, and also *E. succenturiata* for the last three or four years, and I find that *E. succenturiata* commences to emerge early in June, and my specimens are all out by the end of the month; *E. subfulvata* usually emerges during July. I generally commence to beat for larvæ of *E. succenturiata* about the 7th of September, and find them then, in an average season, half-grown; the larvæ of *E. subfulvata* are about the same size in the middle of October. The colour, structure and habits of the larvæ are quite different; with respect to colour I should describe the ground to be, in *E. succenturiata*, warm sepia, in *E. subfulvata*, cold sepia. Of the two, *E. succenturiata* is a more stumpy larva, with a larger head; it is only to be taken in any number at night, as it rests in the day-time amongst the lower leaves of its food-plant; *E. subfulvata*, on the other hand, rests stretched out at full length exposed on the stems and leaves, and can easily be obtained by searching during the day. The chief and most important point, however, by which these species may with certainty be distinguished is in the pupa stage. Probably most lepidopterists who have bred *Eupitheciæ* in numbers have been struck by the difference in colour the various species exhibit in this stage; this is more marked than in any other group of lepidoptera with which I am acquainted; for instance, it is very difficult to separate a long series of imagines of *E. absinthiata*, *E. minutata* and *E. expallidata*: of course the majority of the specimens can be put right at once, but one or two of each species will run into the other, and it is often impossible to say to which they belong; the pupæ, however, are abundantly distinct; again, *E. jasioniata* in the imago state runs very closely to *E. castigata*, but the pupa is quite different, and other species could be mentioned in further support of this point. Now it happens that the pupæ of the two species we are discussing are very distinct; I suppose I must have had some thousands of *E. subfulvata* in my

possession, and I never saw one that varied from the type in colour, which is a rich red, with the wing-cases somewhat lighter and inclined towards buff. I have not had so much experience with *E. succenturiata*, but there are twenty-one pupæ before me now. They all have the abdomen dark buff, inclined towards brown, and the wing-cases of a decided olive-green. I can quite understand that both species feed upon various plants. I have taken occasional imagines of *E. succenturiata* where there was no *Artemisia*, and I understand that in Scotland *E. subfulvata* larvæ are found upon ragwort (*Senecio*). I should not attach much importance to this, however, as many species of *Eupithecia* are more or less polyphagous.—W. G. SHELDON, 15, Alexandra Road, Croydon.

EUDRYAS STAE-JOHANNIS.—A REPLY.—In the *Entomologist's Record*, vol. vi., p. 249, is an article by Mr. Grote on the above species, in which the author makes some speculations as to what Mr. Walker's belief or knowledge was, ridicules my citation of a label which I found on the specimen, accuses me of giving undue value to labels found in the British Museum, and suggests that the labels in this Institution are not to be received or credited without special investigation as to their authenticity. It seems rather absurd, after reading Mr. Grote's article carefully and digesting its bearings, to refer to Walker's description, in Part 9 of the *List of Lepidoptera*, etc., p. 144, and to find in quotation marks, "Taken on the door of the church of Horsleydown by Mr. Bydder." In other words, the label now on the specimen, and quoted by me, agrees perfectly with what Walker himself wrote, and Walker not only knew where the insect actually came from, but also who took it. This also accounts for the name of the insect, for "St. John's" is the church at Horsleydown. Furthermore, it may be interesting to note that Mr. Grote speaks without any personal knowledge in the matter.\* He refers only to a letter from Mr. Schaus, and upon this basis, and upon a number of imaginary considerations, he fills two pages with sarcastic and other remarks on this subject. I have nothing at all to fear from any critical investigation or study of anything I have written, and as I do not claim infallibility, am always ready to admit errors where they are demonstrated.—J. B. SMITH, D. Sc., Agricultural Exp. Station, New Jersey.

These remarks by Professor Smith clear up certain points definitely with regard to a species which has created much interest. It is quite clear that the specimen was not named from, nor taken near, the St. John's river, Florida, as suggested by Professor Grote, but that it was really named from, and captured on the door of the church of, St. John's, Horselydown,† a church within five minutes' walk of the scene of my daily labours. Another point is quite certain, viz., that it was an imported specimen. Within a mile, as the crow flies, of all the largest London docks, the nature of the locality where it was captured leaves no doubt of its importation, and hence its American origin is exceedingly probable. There only remains one difficulty

\* This is hardly so. Professor Grote distinctly writes:—"In 1867 I examined the late Mr. Walker's type of *Eudryas stae-johannis*, and recognised in the specimen a representative of a distinct species, etc."—Ed.

† This is spelt "Horselydown," not "Horsleydown," as Prof. Smith says Walker's label is written.—Ed.

about the specimen, then : Is it "a suffused aberrant *grata*," as Professor Smith suggests, or is it "a representative of a distinct species allied to the common North American *E. grata*," as averred by Professor Grote? According to Professor Grote's note, referred to by Professor Smith (*Record*, vol. vi., p. 249), Mr. Schaus, of Twickenham, supports Prof. Grote's view, the doubtful species having occurred in Mexico. It would appear, therefore, from the evidence at our disposal, that the species is distinct, and one of those unknown up to the present time to Professor Smith.—J. W. TUTT.

IS NOMENCLATURE A PART OF THE SCIENCE OF BIOLOGY?—It is not without considerable diffidence that I take up my pen to write a note which may bear even the faintest suggestion of an undervaluing of Dr. Chapman's splendid work at the "*Genus Acronycta*;" but my love of law and order impels me to protest against what appears to me the very dangerous precedent of allowing his sub-generic names general acceptance as generic in the face of all the established rules of zoological nomenclature. Of course if, as Mr. Tutt assumes (*ante*, p. 58), biology can ever "clash with literature," there is no question which is the more important in the biological science of entomology; but I do not think this is really the case, seeing that the literary and bibliographical part of the entomological science is, and always has been, dependent upon the biological, and the use of names is not in itself, as I take it, any part of biology. I think that practical workers in zoological research have always been accorded the full right of rearranging genera, suggesting new systems of classification, &c., &c., and surely it is only reasonable that this should be so; but what about the separate department of nomenclature?

When Dr. Chapman first proposed his new sub-generic titles in *Acronycta*, I saw no objection, because I understood that they were intended to be biological rather than nomenclatorial; and the Doctor himself continued to treat the group as "the genus *Acronycta*." But when one begins to find records of *Bisulcia ligustri*, &c., one naturally enquires, is the old genus then abandoned, and if so, what right has the new name? If the genus is really to be split up, it must be done according to the rules of nomenclature, and we must call in the aid of a departmental specialist in that direction. And here I would remark that it appears to me that Mr. Tutt's strictures on the use of unfamiliar generic names in the American *Entomological News* (*vide*, *Record*, vol. vi., pp. 80–81, 154) would apply, *mutandis mutatis*, to some experiences which our American cousins may meet with in perusing the pages of the *Record*; only that there is the important difference that such names as *Thamnonoma* may be verified from the ordinary recognised sources of reference, while for *Cuspidia*, &c., search might be made in vain.

Of course the justification which will be offered for the "dangerous precedent" in the erection of Dr. Chapman's names as generic, lies in the exceptional nature of his "monumental work," as Mr. Tutt truly calls it, and I am afraid it will be a long while ere anything will be produced to equal it. But we are hoping that it *will* be equalled some day, and that investigators will arise to work out other groups on similar lines; and then, upon this precedent, it will be farewell to all stability in nomenclature!

The practical issue of these notes of mine is just this: I hold that

there is plenty of room for biologists and students of nomenclature to work harmoniously side by side; we shall get no stability of classification until work of the order of Dr. Chapman's has been carried on throughout, nor any stability of nomenclature until Mr. Grote's work is accepted. And I would most earnestly plead for an understanding between these two classes of workers, in the truest interests of the science whose welfare both seek to promote. To draw my illustration from the case of the *Acronyctidi* (or *Apatela*) at present under notice, we can all, I am sure, accept with the utmost confidence any definite dictum from Dr. Chapman as to whether the group shall form one genus or three; and if the latter is to be the case, we can with equal confidence entrust it to the researches of Mr. Grote, to ascertain for us the correct names of the three genera.—LOUIS B. PROUT, F.E.S., 12, Greenwood Road, Dalston, N.E. November 28th, 1895. [We understand Mr. Prout's position, see our remarks *ante*, p. 148.—Ed.]

NOTE ON ARGYRESTHIA ILLUMINATELLA, ZELL.—Mr. Tutt will, I am sure, forgive me for pointing out that in his notes on *Argyresthia illuminatella* in *Ent. Rec.*, v., 73, and vi., 34, he is in error in saying that Lord Walsingham added this species to the British list on the strength of specimens taken by Salvage, "among larch," at Forres. Salvage himself has no idea under what circumstances he took them, and a reference to Lord Walsingham's remarks in *Ent. Mo. Mag.*, ser. 2, vol. v., pp. 50-51, will show that he merely says, "Three examples in my own collection from Forres, collected by Salvage, . . .," and adds *A. illuminatella*, Zell., to the British list on the strength of these three specimens. But he clearly implies that Salvage, in all probability, did not capture them "among larch," or, at any rate, that the larvæ had almost certainly not fed on that tree, for he goes on to say that if Mr. Atmore can succeed in finding on larch the larva of his insect, which was captured amongst larch, and differs from the Forres insect, he will be justified in separating it as a new species distinct from *illuminatella*. He also adds that as Hartmann mentions larch as one of the food-plants of *illuminatella*, it may be that both forms have been included under one name on the Continent. The words of my friend Mr. Horne, which are quoted in *Ent. Rec.*, vi., 34, show that he, too, has misunderstood the point of Lord Walsingham's remarks, for he says, "I remember Lord Walsingham urged Mr. Atmore to search for larvæ of *A. illuminatella* on larch;" but, as a matter of fact, Lord Walsingham particularly urged Mr. Atmore to search for the larva of *his* insect on larch, in the hope that he might find it on that tree, and thus furnish additional proof of its distinctness from *illuminatella*, which, to the best of our belief, is not a larch-feeder. Sorhagen says that the larva of *illuminatella* occurs on juniper, while Frey and von Heinemann give it as feeding in the buds of some of the species of *Pinus*, but do not mention any of them by name.—EUSTACE R. BANKES, M.A., F.E.S., The Rectory, Corfe Castle. December, 1895.

The remarks made by Mr. Bankes are very just. At the same time it must be confessed that our present position with regard to the *Argyresthia* from Forres, and the *Argyresthia* from King's Lynn, is most unsatisfactory. If they are one species, then, the species must be looked upon as occurring among larch, if not, then Mr. Atmore's species wants a name. We appear to have:—

1. *Argyresthia illuminatella*, Zell.—Taken at Forres (Salvage); bred from Scotch fir (Tutt).

2. *Argyresthia atmorella*, n. sp.—Taken among larch at King's Lynn (Atmore). Fore-wings with a slightly more elongate and acuminate apex than *illuminatella* (Walsingham).

If we provisionally call the King's Lynn species *Argyresthia atmorella*, we shall know where we are.—J. W. Turr.

## CURRENT NOTES.

At the invitation of Mr. Verrall, the members of the Entomological Club held a meeting on January 14th, at the Holborn Restaurant. Many entomological friends were also invited. After a couple of hours spent in pleasant conversation, the whole assembly was most hospitably entertained by Mr. Verrall, whose genial affability ensured a most thoroughly enjoyable social evening. Professor Meldola, Professor Poulton and Mr. Jacoby were among those present, the latter charming the company with a couple of his delightful masterpieces on the violin.

The compilers of *The International Naturalists' Directory* [Swann & Co., Bouverie Street, E.C.,] should attempt something much more ambitious. Their present *Directory* is a handy little pamphlet for British entomologists and ornithologists. We would suggest that that published by Messrs. Friedländer & Sohn would form a good model.

Mr. G. C. Champion adds (*H. M. M.*, January) another Coleopteron to the British List. This is *Pjuraea nana*, Ritter, nearly allied to, but much smaller than *P. melina*: it is also more oval, less elongate, the upper surface is more shining and more finely punctured, the antennæ having the last two joints of the club abruptly black, the apical joint being broader than in *P. melina*; the thorax is more narrowed behind and the elytra are more rounded at the apex.

## VARIATION.

THE VARIETIES OF *LEUCOPHASIA SINAPIS* WHICH OCCUR IN BRITAIN.—Writing of the varieties of *L. sinapis*, Mr. Tutt says (*ante*, p. 81): "I presume that a very large proportion of our British male specimens, captured in May and June, are of this variety (*lathyri*, Hb.)." For several years I have taken both broods in Devonshire, but I have never seen one with the underside of the hind-wings at all greenish (some sixty or more must have passed through my hands). These are invariably more or less clouded with gray, from an admixture of black scales with the white ones, mostly below the discoidal cell and the lowest discoidal nervure. One of my ♂ specimens of the first brood has the apical spot black and round. The small second brood is to be found early in August, and has the underside of the hind-wings similar to that of the first brood. I have never come across one pure white (var. *diniensis*). All the ♀'s I have taken have traces of the apical spot, the black scales having a linear arrangement along the nervures, which they cloud more or less, but never so much as to render the insect difficult to distinguish from the ♂. There seems another simple way of separating the two sexes at a glance (independently of the genitalia), which I do not remember to have seen noticed, *viz.*, by the antennæ. In my series of 38, all the ♂'s

(16) have a very conspicuous blotch of pure white scales on the under-side of the club, below its reddish-brown tip, which in the ♀'s (17) is reduced to a few white scales, varying a little in number, but never forming a conspicuous blotch. The distinction is readily seen with a pocket lens, or even by the naked eye, on close inspection. Will observers note if their series confirm this?—W. S. RIDING, M.D., F.E.S., Buckereil Lodge, E. Devon. *November, 1895.*

VARIETIES OF *HYBERNIA DEFOLIARIA*.—With reference to Mr. Walker's query (*ante*, p. 143) as to the distribution of the two forms of *H. defoliaria*, I have bred that species freely from the Wimbledon district and also from Wanstead, and have found both forms in each place pretty equally distributed, that is to say, the banded and the more or less unicolorous form with line through the wing; the entirely unicolorous form without any line I have always looked upon as far less common than the banded. It is a species that evidently follows heredity to a great extent, as, by selecting a remarkably fine banded male, I succeeded in rearing some grand forms, and in the second and third year they all came true. After that the race was too weak to continue.—A. W. MERA, 79, Capel Road, Forest Gate. *January 3rd, 1896.*

I have bred *H. defoliaria* from three localities, *viz.*, Durham, Chester and Scarborough. The banded form only from Durham, both the other forms from Chester and Scarborough, with a rather larger proportion of unicolorous forms from Scarborough than from Chester.—T. MADDISON, South Bailey, Durham. *December 27th, 1895.*

Two forms of *H. defoliaria* occur near Emsworth, the dark brown unicolorous form and the pale banded form.—W. M. CHRISTY, F.E.S., Watergate, Emsworth. *January 8th, 1896.*

POLYMORPHISM OF *HYBERNIA DEFOLIARIA*.—I took here last week thirteen *H. defoliaria*, no two of which were alike, the variation extending from a light ochreous colour to nearly black, one specimen being so dark as not to show any markings on either the upper or under wings.—E. R. BUSH, 71, Strathmore Street, Bridgend, Perth. *December 7th, 1895.*

*ACIDALIA AVERSATA* AND ITS ABERRATION *SPOLIATA*.—I have always been puzzled about *A. aversata* and its aberration. Mr. Maddison has been kind enough to answer a query as to their differentiation, telling me that the banded form is the type, so that var. *spoliata* will be the ordinary form. Our two standard books have helped to propagate an error. Stainton distinctly states that the banded form is a "variety," and Newman goes so far as to give it a name, and calls it "var. *remutata*," and the unicolorous insect with lines he writes of as "var. (*sic*) *aversata*." If we take the banded form as type (*A. aversata*), we can understand the meaning (otherwise inexplicable) of ab. "*spoliata*," *i.e.*, "robbed of" or "despoiled of" the band. I am informed by Mr. Tutt that Staudinger (*Cat.*, p. 150) writes of *aversata*, Linn. (= *lividata*, Gn.), as follows: "*alæ, fascia media lata nigricante*," whilst ab. *spoliata*, Stdgr. (= *aversata*, Tr.) is diagnosed (*l. c.*) as "*forma vulgaris, non fasciata*."—W. S. RIDING, M.D., F.E.S., Buckereil Lodge, E. Devon. *December, 1895.*

## PRACTICAL HINTS.

UNIFORMITY IN THE SIZES OF PINS USED.—I am glad to see a discussion raised as to setting; very unfortunately, scarcely any two men

set exactly alike. It would be something gained if we could get anything like uniformity in pins. Black ones are now generally used, though a few people still stick to white or gilt (I have rather a strong leaning to the latter myself). My experiences have taught me that the best pins are the improved kinds, made by D. F. Tayler and Co., which do not bend and curl up at the points, like so many of those of other makers. I find the best sizes are (1) for small Geometrids, small butterflies and small Noctuids—No. 9; (2) for medium sized insects—No. 8; (3) for the larger Noctuids—No. 17; (4) for the Sphinges—No. 18. These sizes will be all that are required for Macros.—T. MADDISON, South Bailey, Durham. *December, 1895.*

**LABELLING INSECTS.**—With regard to the data given with insects, we ought to have the exact date, not only the year, but the month and day when possible; and I would further suggest that in all cases where the owner has not himself caught or bred an insect he should state from whom he got it, and supply the data given by that individual. Exact and reliable data add greatly to the value of an insect, whereas if a collector resident in Devon simply gives as data—say “York, 1894,” one does not know on whose authority this is stated, nor what value to attach to it.—E. F. STUDD, M.A., B.C.L., F.E.S., Oxtou, near Exeter. *December 15th, 1895.*

With regard to the labelling of insects, I find that a general locality, such as “Box Hill,” “Rannoch,” &c., is sufficient for geographical distribution, with the captor's name, and the date of the capture added. The obverse side of the labels I use is similar to this:

UNST. 1895.  
J. J. F. X. KING.

This I use for all ordinary insects, but when I want any further details as to the history of the insect, I write such on the reverse, or add the date thus: 3. vii.. It will be seen that each insect thus carries a history with it, *viz.*—(1) Place of capture. (2) Year. (3) Captor's name in the case of common insects, with the precise date added for any rare species or variety. If the captor wished, he could place all the information in type, although this means shifting the type for each day's collecting. I think the first plan the more useful, and, besides, it does not take up much room.

As to the important point of procuring the type. If a number of entomologists would agree together to purchase a set of type, with ink-holder, &c., it could be procured, I think, at about 5s. each set. To be of any use the type must be that supplied by the best founders.

Until some arrangement for labelling insects is adopted, no reliance can be placed on the information tendered by people with the insects which they send out. I would ask whether it is reasonable to suppose that anyone taking an insect out of his store-box can tell when and where the insect was taken, more particularly if it was captured a year or two ago. For my own part, I do not believe in it.—J. J. F. X. KING, F.E.S., 207, Sauchiehall Street, Glasgow. *December 20th, 1895.*

**A METHOD OF OBTAINING PUPÆ.**—The following note on pupa-catching may perhaps interest those readers who have not tried the method, and who have suitable trees in their grounds. Fasten a band round the trunk below the boughs; the band to be made of rough cork or oak bark, also (where its appearance is not objectionable), I recommend a second band below the cork; the second band may be of sacking (or other cloth), its lower edge fastened tightly to the trunk, its



upper edge separated from the trunk by a galvanised wire which has been first twisted (round a ruler) into a spiral form, and fastened round the trunk by hooking its ends together. The sacking-band may then be filled with earth or cocoanut fibre, for descending larvæ to pupate in. I have had most success with poplar. The chief difficulty is to find all the pupæ, as the cork is so easy to penetrate that the boring of the larvæ is scarcely visible.—F. NORGATE, 98, Queen's Road, Bury St. Edmunds. *December, 1895.*

## NOTES ON COLLECTING, Etc.

BREEDING *PLUSIA BRACTEA*.—I took a female specimen of *Plusia bractea* on July 16th, which laid three eggs on the 17th July. These hatched on July 24th. The larvæ were kept in a cold frame until they showed signs of hybernation, when two of the larvæ were put into a stove where the temperature varied from 65° to 80°. One of the larvæ had already died; another one never looked healthy, but fed up and turned to a chrysalis, and died in that state. The third fed quickly, and spun up on October 5th, emerging on October 19th, a fine specimen. The larvæ were fed on groundsel (*Senecio vulgaris*). I bred five or six specimens in 1889, the same way, except that the larvæ were then fed on lettuce.—JOHN FINLAY, Meldon Park, Morpeth. *December 28th, 1895.*

SPHINX CONVULVULI IN SCOTLAND.—On September 21st a specimen of *S. convulvuli* was brought to me by one of the gardeners, having been taken at rest in one of the greenhouses here (Douglas). The moth had evidently been attracted by the *Lilium auratum* plants, as its proboscis was covered with the pollen of this lily.—(Rev.) J. A. MACKONCHIE, M.A., F.E.S., Douglas Castle, Lanark.

PLUSIA NI.—On July 24th, I took, flying over heather on a moor, what I think is a specimen of *Plusia ni*; but have at present had no opportunity to verify my capture.—IBID.

OCCURRENCE OF SPHINX CONVULVULI IN CAITHNESS.—When in Caithness last week I saw a specimen of *S. convulvuli*, which had been taken at the beginning of October, on a garden railing in Putney Town, Wick. Apparently the species has been found this season almost from Land's End to John O'Groats.—ARTHUR HORNE, F.E.S., 52, Irvine Place, Aberdeen. *December 3rd, 1895.*

ACHERONTIA ATROPOS IN GLASGOW.—During the last week I had given to me two specimens of *A. atropos*, which were captured in this city. One of the specimens was taken on a window-sill, and is in fine condition.—J. J. F. X. KING, F.E.S., Glasgow. *December 16th, 1895.*

MICROS IN SCOTLAND IN 1895.—I found *Micros* generally much scarcer than usual this season. The following are the principal species that I met with: *Scopula alpinalis*, rather common in grassy places, at Braemar. *Scoparia ambigualis*, common almost everywhere throughout the north, but not nearly so abundant as they were last year. *S. dubitalis*, common on the Kincardineshire coast, and on the sand-hills north of Aberdeen. A few ochreous forms occurred. *S. murana*, scarce at Aberdeen; common on the stone fences near Kildary, Ross-shire; the specimens varied a good deal in depth of ground-colour and intensity of markings. *S. alpina*, much scarcer than usual on a grassy flat near Braemar. *Crambus dametellus*,

scarce on the banks of the Dee, near Braemar; abundant on the sand-hills north of Aberdeen, and in Morayshire; *C. furcatellus*, scarce at Braemar; *C. margaritellus*, scarce at Archiestown (Morayshire), and Braemar; *C. perllellus* and var. *warringtonellus*, swarming on the Morayshire sand-hills, does not occur at Aberdeen; *Phycis carbonariella* was abundant in Glen Derry, Braemar; *Dioryctria abietella*, one at rest on a paling at Gellybog, Morayshire; *Tortrix ministrana*, abundant among birch at Braemar and Urquhart, Morayshire, some very dark forms occurred; *Amphisa prodromana*, not uncommon on the moors near Aberdeen; *Leptogramma niveana* var. *scotana*, one on the trunk of a birch on the Culbin Sands, near Forres; *Penthina praelongana*, common among birches at Braemar and Aberdeen; *P. staintoniana*, scarce among bilberry at Braemar; *Sericoris littorana*, common at Muchalls, on the Kincardineshire coast; *S. irriyana* swarmed on the higher slopes of nearly all the hills about Braemar, among bilberry; *Miwodia palustrana*, common on the moors at Aberdeen and Braemar; *M. rubiginosana*, scarce at Burghead, Morayshire; *Sciaphila penziana*, a beautiful series, in Glen Derry, Braemar; *S. colquhouniana*, scarce on the cliffs of the Kincardineshire coast; *Phoxopteryx myrtillana*, abundant everywhere among bilberry; *Coccyx cosmophorana*, I get pupæ of this species in one-year-old resinous nodules, that have been tenanted by *Retinia resinana* the previous year. I should like to know more about this insect, and under what conditions the larvæ or pupæ have been found elsewhere. *R. pinivorana*, scarce near Aberdeen; *R. resinana*, abundant as larvæ and pupæ, the resinous nodules being very conspicuous on the fir trees, most plentiful in the Forres and Elgin districts of Morayshire: scarcer at Balnagowan (Ross-shire), and Aboyne and Dinnet (Aberdeenshire). The larvæ take two years to feed up, and the moth appears only every alternate year in those localities where I have collected; *Stigmonota coniferana*, scarce at Aberdeen and Burghead; *Dicrorhampha herbosana*, abundant on the sand-hills north of Aberdeen; *Hypocilia ciliana*, common, and very variable on all the moors near Aberdeen.—A. HORNE, F.E.S., 52, Irvine Place, Aberdeen. December, 1895.

MICRO COLLECTING AT CLEVEDON IN 1895.—I found Micros, particularly Tortricides, uncommonly scarce last season in this district. Even that pest *Tortrix viridana* was scarce. Would that it were always so! I did not see a single specimen of many species usually abundant, and the species that did occur were not plentiful. PYRALIDES and CRAMBIDES, with the exception of the very commonest species, were also scarce. I only took half a dozen *Botys lancealis*, and these not in good condition.—J. MASON, Clevedon Court Lodge, Somerset.

AUTUMNAL CAPTURES.—On November 22nd I found a ♂ *Poecilocampa populi* on my study window. This led me to light up my moth-trap, and on the following morning I found in it one *P. populi* ♀, one *Asteroscopus sphinx*, sixteen *Hybernia defoliaria* (including some very nice aberrations), and one *H. aurantiaria*. On the night of November 27th, though apparently perfect for light, no moths came to the trap, although hundreds of gnats were attracted.—(Major) R. B. ROBERTSON, Coxhorne, near Cheltenham. November, 1895.

AGRIOPSIS APRILINA AND EUCHELIA JACOBÆÆ IN PERTH.—I was rather

surprised to see (*ante*, p. 156) that *A. aprilina* is usually so scarce in Montrose, as it is taken here most freely. *E. jacobaeae* has been taken here this year for the first time (I believe), two being captured at Almond Bank, Perth.—E. R. BUSH, 71, Strathmore Street, Bridgend, Perth, N.B.

LEPIDOPTERA AT BATH.—The season 1895 opened well. In March, *Hybernia marginaria* and *H. rupicaprararia* were taken in large numbers, whilst a little later *Anisopteryx aescularia* put in an appearance, shortly followed by *Phigalia pedaria*. I paid two or three visits to the shallows in April, but only saw a few *Taeniocampa cruda* and *T. gotthica*. Towards the end of April, a large number of *Selenia bilunaria* were taken, amongst which were some unusual forms. Early in May *Euchloe carlamine*s and *Pieris napi* were taken, as well as *Anticlea derivata*, and later, *Scotosia certata* (? in May.—Ed.), *Emmelesia decolorata*, the latter being very abundant among campions in this district. Towards the end of May I took *Odontopera bidentata*, *Notodonta dictaea* and *Noctua c-nigrum*. In June, the following, amongst other species, were captured:—*Thera variata*, *Nemoria viridata*, *Anticlea rubidata*, *Grammia trigrammica*, *Aplecta advena*, *Cucullia umbratica*, *Hecatera serena*, *Xylophasia sublustris*, *X. lithoxylea*, *Dianthoeia cucubali*, *D. carpophaga*, *Azylia putris*, *Plusia iota*, *P. bractea* and *P. chrystitis*. In the beginning of July the following were taken at sugar: *Viminia runcicis*, *Gonophora derasa*, *Xylophasia scolopacina*, *X. hepatica*; whilst the following GEOMETERS: *Pericallia syringaria*, *Metrocampamargaritaria*, *Crocallis elinguaris*, *Eubolia palumbaria* and *Anaitis plagiata* were also captured. In September, at ivy, the following insects occurred:—*Xanthia citrigo*, *X. fulvago*, *X. flavago*, *Hydroecia micacea*, *Anchocelis lunosa*, *A. pistacina*, *A. litura*, *Mellinia circellaris* and one *X. aurago*. At light, *Diloba caeruleocephala*, *Eugonia angularia*, *Epione vespertaria* (? Ed.) and *Polia flavicincta* were taken, whilst the October captures included *Agrotis ypsilon*, *Peridroma saucia*, *Orthostia lota* and *O. macilentata*.—T. GREER, Bath.

## NOTES ON LIFE-HISTORIES, LARVÆ, &c.

FOOD-PLANTS OF *HYPENODES ALBISTRIGALIS*.—In reply to Dr. Ridg (*Ent. Rec.*, vii., p. 113) I may say that the life history of this species was made known by Heer P. C. T. Snellen in 1890, in Vol. xxxiii. of the *Tijdschrift voor Entomologie*, pp. 174-176, under the name of *H. taenialis*, Hb.; Prof. van Leeuwen reared it from its egg in 1887, and found that the larva would feed on the flowers of *Thymus serpyllum* and *Calluna vulgaris*. The former was probably offered them on account of Hellins' treatment of the allied *costaestrigalis*, recorded in *E. M. M.*, vi., p. 216; and Snellen mentions the occurrence of *albistrigalis* in pine woods where heath and fern covered the ground; so it is not unlikely that *Calluna* flowers may be its food plant in a state of nature.—LOUIS B. PROUT, F.E.S., 12, Greenwood Road, N.E. December, 1895.

NOTES ON REARING *POLIA XANTHOMISTA* (NIGROCINCTA).—I have had considerable experience in breeding this species for many years, and a few notes on the subject may be of interest to the readers of this magazine, especially to such as have received eggs from me this season. It is not very easy to rear from larvæ collected in the wild

state. These are very liable to be "ichneumonized"—of those collected last season, four out of five were stung. Change of air and of food-plant do not help the breeder of this species; the larvæ often sicken and die from this cause. Can the species be reared from eggs? The eggs must first be obtained, and this is no easy task. You require a pair of strong boots, and, if you are a devotee of football, you will find that your shin-guards will come in handy. Then take a ticket to the Isle of Man for a week or a fortnight. After your arrival there, take rest, and in the morning make for the coast and set about climbing the rugged rocks—the rougher they are the more chance of success—and searching in every nook and corner of them. You cannot work for a great length of time the first few days. Work the rocks up and down; sometimes you will be more than a hundred feet up the cliff, at another time close down to the sea. Do not be disheartened if you do not find anything the first few days. Try again, for you will succeed if you persevere, and if you come across a female she will, no doubt, reward you for your labours with a nice batch of eggs. I was fortunate enough to take two females this season, and from them obtained a nice lot of eggs. My friend Mr. Taylor, although he searched very hard for a week, did not take either a male or a female. *P. xanthomista* passes most of its time in the egg-stage, remaining in that stage from September till May. The eggs require very little attention: they will do all right if kept in any room where there is no fire. The larvæ all hatch within a few days of each other. If the flowers of thrift, which is their natural food-plant, cannot be obtained, the larvæ will take readily to sallow or groundsel. They do not grow very fast during the first week, but soon begin to eat freely, and go down by the end of June. The larvæ feed only by night, and like to hide under small stones in a warm, dry situation. A very little stale food is certain death to them; they never seem to recover if once they taste it; but they will hunt for and find it if there is any about. Old food should never be allowed to remain in the bottom of the cages. Growing plants in small pots are the best, and it is very easy to have a few planted in readiness for the hatching of the larvæ. I cover mine over with small glass cylinders, covered at the top with fine gauze. They will pupate under the small pieces of stone, forming an earthen cocoon, and do not require more than an inch of fine soil or sand; but I think it is important to have the bits of stone, as the larvæ seem to require a little pressure. I do not disturb the pupæ, and did not lose a single one this season. They remain in pupa about three months.—H. MURRAY, Lowbank Villa, Carnforth. *December, 1895.*

FORCING *ACHERONTIA ATROPOS*.—From five living pupæ of *A. atropos* I managed to secure two perfect insects this year by forcing. I placed them in a big pot upon the kitchen range. The first, which was perspiring under a temperature of 100 deg. F., when discovered, squeaked splendidly, and flew about the kitchen when released. The second, dug up on a Thursday, submitted to heat, appeared on the following Thursday. Of course, the earth in the pot was kept almost saturated with moisture.—(Rev.) C. R. N. BURROWS. *November, 1895.*

PROBABLE WANDERING HABIT OF *CERURAS* BEFORE PUPATION.—Dr. Chapman's remarks (*ante*, p. 73) about *Cerura bicuspis* and the pro-

bable habit of its larva of leaving the tree and pupating elsewhere, remind me that last September I found a freshly formed cocoon of *C. vinula* upon a stone in a loosely-built stone wall. There were aspen trees close by. There was next to no lichen upon the stone, so the cocoon was simply formed of the glutinous substance. In colour it was somewhat grey, like the stone. When removed from the latter, there was hardly any perceptible mark left. The stone appeared to have been proof against the jaws of the larva.—W. M. CHRISTY, F.E.S., Watergate, Emsworth. December 23rd, 1895.

A DIFFICULTY MET WITH IN BREEDING *SESIA SPHEGIFORMIS*.—In the summer I bred a few specimens of *Sesia sphegiformis*. Several of the pupæ dropped out of the burrows, when they were obtuded for emergence. It has been my constant experience that under such circumstances the imagines fail to emerge without immediate manual assistance. Possibly this dropping out is caused by the shrinking of the alder stick, causing a disturbance of the ordinary conditions under which emergence takes place, and that, without the natural leverage, the imago cannot get rid of the pupal skin. It is, I should think, very improbable that any pupæ will be lost in this way in a state of nature.—T. W. HALL, F.E.S., Stanhope, The Crescent, Croydon. December, 1895.

ON THE EGGS AND EGGLAYING OF *EPINEPHELE JANIRA* AND *HIPPARCHIA SEMELE*.—Does *Epinephele janira* scatter her eggs loosely over grass as she flutters about (G. F. Mathew), or do the females deposit their eggs on various species of grass (Newman)? I should be very thankful for any reliable observations on the egg of this species, which Rühl describes as:—"Kugelig, weisslich, mit Längsleisten, oberhalb schuppig, mit gewellten dunkleren Querbinden." This is the only published description I can find. The only one available of *Hipparchia semele*, is "Ei gerippt, gelblichweiss." Has any British entomologist descriptions of these eggs?—J. W. TUTT.

## SOCIETIES.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—December 17th, 1895.—Exhibits:—Rev. C. R. N. Burrows: a specimen of *Chariclea umbra* infested by a hair-worm (*Gordius aquaticus*), a creature parasitic on crustacea, fish and insects (both land and water) at various stages of its existence; also a preserved larva of *Ptilophora plumigera*, showing a bifurcated structure on the second segment in a corresponding position to that occupied by the transverse slit in *Diceranura vinula*, through which the larva ejects an acrid fluid when annoyed; this was retracted when the larva was quiescent. Mr. Tutt said that this structure was popularly known as the "chin gland," and was very common in larvæ belonging to very divergent groups of the Lepidoptera. He suggested that it was probably of service in protecting the larva from its enemies, and he suggested the possibility of its having once been more distinctly functionally active than it appeared to be at the present time. Mr. Mera: a specimen of *Saturnia pavonia*, which was principally female, but the wings on the left side were shaped and coloured like male wings, though somewhat paler; the right wings were just tinged here and there with male coloration, and the left antenna was decidedly more pectinated than the

right. He also showed two bred examples of *Cidaria silaceata*, from Morpeth; both were very pale, and the markings were very indistinct in one of them; part of the brood emerged in August, and were dark, the rest came out in the following May, and were mostly light. Captain Thompson (on behalf of Dr. Buckell): a long series of *Orrhodia ligula*; they were bred from a batch of ova laid by a Herefordshire female, found by Dr. Chapman. The moths, as soon as their wings had dried after emergence, crept under a piece of moss in the breeding-cage, and remained concealed during the daytime. Mr. Sauzé: male and female specimens of *Anthidium manicatum* (the Hoop-shaver bee) from Deal. Mr. Tutt exhibited, on behalf of Mr. W. F. de V. Kane, some specimens of *Melitaea aurinia*, illustrating the var. *praeclara*, Kane, and the ab. *hibernica*, Birchall, and read the following notes, which Mr. Kane had forwarded with the specimens:—

“The specimens sent consist of (1) Three specimens of *M. aurinia* from Cromlyn, part of the batch out of which Mr. Birchall named his ab. *hibernica*. Of these the 3rd is the nearest to his description. As to the ♀, Mrs. Battersby has none in her collection two inches in expanse, much less two inches three lines. Mr. Birchall says in his descriptions: ‘♂ Fore-wings black, etc.’; ‘♀ Fore-wings fulvous’ and no mention of black on the wings. The damaged third is an authentic specimen given by Birchall to the late Mr. S. R. Fetherstonhaugh, of Dublin, apparently a ♀ var. *scotica*, and No. 1 is a ♂ of the same.” (2) “Four specimens of *M. aurinia* of my own capture. No. 1 is from Wicklow, the best ab. *hibernica* I have ever taken. Nos. 2, 3 and 4, my var. *praeclara* from Wexford, Kerry and Waterford.”

Mr. Tutt, remarking on the specimens, said:—“There is no doubt from Birchall’s remarks in the *Ent. Mo. Mag.*, vol. x., p. 154, that he was not very conversant with the forms that *M. aurinia* takes, for he considered the Scotch specimens to be the same as var. *merope* of the Continent, on the strength of Staudinger’s short diagnosis of the latter ‘alpina, minor, obscurior.’ In the general information he appends, he states that in Irish *M. aurinia* ‘the fulvous spots on the upper surface are largely replaced by white or cream-coloured blotches, giving the insect at first sight the appearance of *Melitaea cynthia* ♂. It is larger than English, and very much larger than Scotch specimens of *artemis*, the wings of the female frequently reaching 2½ inches in expanse.’ So far as the remarks relating to size are concerned, we must take Birchall’s statement unless we charge him with untruth. He gives, besides the general information mentioned above—‘Expanse of wings, ♂ 1 inch 4 lines—1 inch 8 lines; ♀ 2 inches—2 inches 3 lines.’ The specimens from many localities vary almost as much as this. The following is Birchall’s description of the male *hibernica*:—‘Alæ supernè nigræ, anticæ maculis seriatim dispositis fulvis ad marginem posticum, aliisque in medio plurimis albis vel stramineo-albidis ad marginem anteriorem coalescentibus, lituram formantibus; posticæ fasciâ latâ fulvâ secus marginem posticum (exemplorum typicorum maculis fulvis margine postico nigro angusto obsitis in varietate vel indiscretis-simis vel nullis) ornatae; subtus pallide-fulvæ, signaturâ simili at indiscreta.’ ‘♀ Alæ anticæ fulvæ, seriebus macularum albarum vel stramineo-albidarum duabus, interdum confluentibus fasciasque formantibus, fasciâ exteriore trans alas posticas productâ, notatæ; posticæ ut in typicis, sed maculis

stramineo-albidis nec fulvis ornatae." It will be observed from this that Birchall gives the coloration of the males as "nigræ," of the females as "fuscæ." It will be also noticed that, of the three Cromlyn specimens exhibited, the male is much the blacker and the females the more fulvous. As to the criticism of Mr. Kane (*Ent.*, xxvi., p. 141), that Birchall makes the hind-wings "ornamented neither with pale straw-coloured nor fulvous patches," it appears to me that Mr. Birchall says: "the posterior wings as in the type, but ornamented with straw-white, not fulvous patches," Mr. Kane having added a "nec" to the original to get his reading. In the *Ent. Mo. Mag.*, x., p. 154, Mr. Birchall refers to a coloured plate obtainable from him privately, in which var. *hibernica* is figured with the English, and what he considers the Scotch form. I have never seen this plate, but Mr. Kane, referring to it, writes:—"The plate shows clearly that 'fulvis' should be 'stramineis' in the Latin description of the male. That of the female does not agree with the plate in the latter, having the straw-coloured patches." This, I take it, makes the figure agree with the description. The Cromlyn male is very dark, and would do for Birchall's *hibernica*, but hardly satisfies Birchall's statement that "there are many other whitish-yellow spots in the centre of the wing;" it strikes me, indeed, as being an exceptionally dark aberration, even of the race Birchall described, with which, however, it agrees in the "very inconspicuous" extreme marginal spots of the hind-wing. In the females, the fulvous colour is much better developed than in the var. *scotica*. From an examination of these specimens, and careful consideration of Mr. Kane's remarks, we must assume that var. *praeclara*, Kane, is in Ireland (as the type, which is of a less brilliant colour, is, in England) the commonest form; and that the ab. *hibernica* is a form more nearly approaching var. *scotica*, differing from the latter mainly in the great development of the reddish fulvous areas. The Cromlyn male must, I think, be looked upon as an aberrant specimen of the same race.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY, January 9th, 1896.—Mr. Carpenter exhibited a long series of *Colias edusa*, bred from ova deposited by a female captured in August, 1895. The last emerged during the third week in November. Mr. Mansbridge, a series of *Hybernia marginaria*, consisting of the typical London forms and a long series of melanic and variegated forms from York. A long discussion took place on the occurrence of these melanic forms. Mr. Mera, a series of *Agriopis aprilina*, from Elgin and Sussex. The northern specimens possessed very complete dark bands. Mr. Edwards, *Papilio cenea*, Stoll., and the three forms of its female, viz., *cenea*, Stoll., *hippocoon*, Fb., and *trophonius*, Westw., with intermediate forms; the three species of *Danaïdæ* mimicked by the above, viz., *Amauris echeria*, *A. dominicanus* and *Danaïs chrysippus*; the closely allied species *P. meriones*, male, from Madagascar, and *P. merope*, male and female from W. Africa, with *Amauris mavius*, which the latter mimicked; and also *Diadema misippus* and *D. anthedon*, which mimic *D. chrysippus* and *A. dominicanus* respectively.

ENTOMOLOGICAL SOCIETY OF LONDON.—The Sixty-third Annual Meeting was held on January 15th, 1896, when Professor Meldola delivered an Address, in which attention was called to the interesting

discoveries in insect physiology by Latter and Hopkins. The main portion of the Address, however, was devoted to a plea for a more liberal use in biological work of the theoretical or speculative method which had proved so fruitful in other branches of science, and which, in the President's opinion, might with advantage be more freely employed in connection with entomological investigation. Illustrations were taken from the work of Bates on mimicry, Wallace on the colours of insects, and Poulton's researches on variable colouring, all of which had been prompted by hypothesis, and which had led to discoveries of large bodies of facts which would never have been gleaned by haphazard observation. The address puts forward so thoroughly and clearly the respective claims of systematic and philosophic entomology, that one cannot doubt but that every entomologist of repute will as soon as possible make himself quite conversant with it.

---

## REVIEWS AND NOTICES OF BOOKS.

### British Lepidoptera.\*

Advance is only chronicled when a man steps out of old ruts and strikes out a new path for himself. Such a man our author appears to be, for there can be no doubt that his book is entirely unlike any other that has been offered to the British public.

It has now become a generally recognised law that any system of classification which may be finally adopted must be based on evolutionary lines. Our author recognises this, for he states that Darwin's *Origin of Species* "effected a revolution in the principles of classification" and "was first published at the end of the same year as Stainton's *Manual*," and that "it is, perhaps, not very creditable to British lepidopterists that so little progress should have been made meanwhile in this direction," i.e., in the direction of obtaining "satisfactory information on structural distinctions." This statement is dated August 5th, 1895, and wants examining carefully.

The first thought is that this statement is due to an oversight. In March last a "Correlation of various recent systems in the classification of the Lepidoptera," was read before the Entomological Society of London, and was, we believe, submitted to our author. He, therefore, knew of the existence of the work of Comstock, Chapman, Dyar, Hampson, Packard and others, in this direction. The second thought is that the statement is naive, and the careful overhauling of the book shows that our author knows next to nothing about the work of his contemporaries, and assumes, because he knows it not, that none has been done, and that all work that has been done has been achieved by his own unaided efforts; and yet there is a suspicion, as we turn over the last pages of the book, that he must have read Chapman's 1893 and 1894 publications on the values to be attributed to certain INCOMPLETE, although it is evident that they have never been thoroughly assimilated.

It is now well recognised that no system of classification which is not based on all the stages of an insect's life is likely to be accepted.

---

\* *Handbook of British Lepidoptera*, by E. Meyrick, B.A., F.E.S. [Macmillan & Co., 10s. 6d. net].



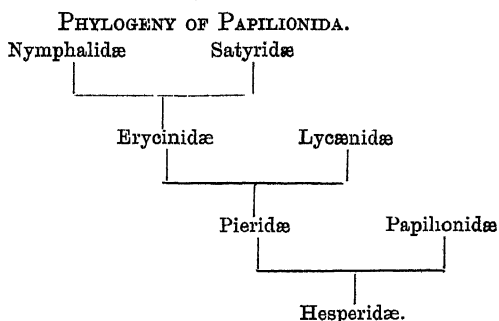
Each stage gives certain evolutionary characters, and it is only by a combination of all these characters that any useful scheme can possibly be formulated. Hence we require a number of specialists, each at a particular branch of work, to give us their results as completely as may be. The correlation of all these various systems will give us our ideal system of classification. Our author must know this, yet he writes with all the self-assumption possible:—"The structural characters are in every instance drawn up from my own observations." We fail to find the use of what we call "structural characters." Our author further states that "the system of classification, though now fully published for the first time, is not based on the British species only, but is the outcome of my study of the Lepidoptera of the whole world." This accentuates the position. Our author, in attempting too much, has simply taken the most superficial characters:—"Eyes—glabrous or hairy," "antennæ—pectinate, bi-pectinate or simple," "neuration"—in which the numbers used are often not always analogous in allied species, and so on.

Progress is usually made by slow steps, but when progress is continuous it makes, in the course of a half century, a considerable total. Such has been our position in the classification of the Lepidoptera. Now, it must be evident that when a man takes an enormous leap backward, into a past which, to the present race of scientific men, is practically unknown, such retrogression may appear to the uninitiated a progressive movement, being practically a leap into the dark, and when this retrogression is accompanied with a fair mixture of more recent detail, one is simply still more muddled. This is our author's position. He has receded to the time antecedent to Stephens, for his genera. His generic characters are unequalled, except by those used by certain lepidopterists, who name a new genus without a description at all, thus:—"GENUS—*v.* TYPE—*y.* The genera are often reduced to absurdity, and are often mere transpositions of the same words. His "Phylogenetic tables," without explanations, will prove amusing items of scientific jugglery to many of us, and nothing can be more simple, from a man who poses as having produced a scientific book, than the cool way he summarises descriptions of larvæ made from works without any references thereto, and then writes:—"Larval descriptions require to be made from living specimens, and it would have been impossible to hope to see most of the species within a limited time; I have therefore drawn up these to the best of my judgment from a comparison of the most trustworthy published descriptions, though they are often amazingly contradictory," which, put into plain English, reads:—"Although I have not seen, nor had time to see, the various larvæ described, I have, where authors disagree in their descriptions, determined which, in my judgment, is correct, and which is incorrect.

One is astounded throughout at the certainty with which our author regards his conclusions. It matters nothing that they are opposed by all the close research of Comstock, Chapman, Dyar, Packard, and all other entomologists, our author, who defines genera on a "thoracic crest more or less developed," who will admit moths with ciliated, partially ciliated and simple antennæ into the same genus, is certain of everything, and tells us with all the pedagogic authority possible that "there would be considerable justification for uniting the *Lycaenidae* with the *Pieridae*." To which we can only reply in our ignorance—Indeed!

We append one of the little Phylogenetic tables in which our author

gives himself away. This is exceptional, for it is rarely one knows where he is or where one is one's-self. Here it is:—



Now, we call this a really clever table, clever from its extreme simplicity. Chapman can tell us of pupal segments; Dyar of larval tubercles, but here is the Phylogeny on the "six feet" and "four feet" structure, a retrogression that leads us back to Linné, but in its new dress how modern it all appears. Would that all these "tables" were based even on such good ground as this!

The author's main character is neuration. It may be well to examine one of his conclusions, taken at random, based on this feature. The neuration of all our Blues is identical with that of *Chrysophanus* and *Zephyrus* (*quercus* and *betulae*), and the characters it presents form a marked characteristic of the Lycænidæ. But *Callophrys* (*rubi*) and *Thecla* (*pruni* and *v-album*) present marked variations from the normal type, and in doing so, in a subfamily in which the neuration is unusually constant, the variation must be looked upon as an important character, yet we find the *Lycænidæ* divided into three genera, and these three genera tabulated as follows:—

Fore-wings with 6 (nervure) out of 9  
 " " 6 separate

1. *Thecla*.
2. *Chrysophanus*  
and *Lycaena*.

Then we find 2 separated as follows:—

- (1) Eyes glabrous=*Chrysophanus*. (2) Eyes hairy=*Lycaena*.

Now one might safely assume that the neuration of *Thecla* (which includes, according to our author, *v-album*, *pruni*, *rubi*, *quercus* and *betulae*) exhibits some characteristic difference from the neuration of *Chrysophanus* and *Lycaena*, yet it is a fact (and to make doubly sure we have just run over our slides of the wings of every British species in the family), that the neuration of *betulae* and *quercus* is identical with, and that of *pruni*, *v-album* and *rubi* entirely different from, that of *Chrysophanus* and *Lycaena*. Further on, to get out of the complication this has brought about, we read that *Thecla* has the nervures of the fore-wings so arranged that "6 is out of 9, 8 out of 9 or absent," which is a very clear definition, and suggests a character that is quite reliable (besides being different from the character of the genus as given above); and then our author, after combining the three genera represented by our British Hairstreaks, and which Scudder differentiated clearly enough ten or twelve years ago on oval, larval, pupal and imaginal characters, divides *Chrysophanus* and *Lycaena* as follows:—

"*Chrysophanus*.—Eyes glabrous. Club of antennæ elongate. Fore-wings 6 separate, 8 and 9 stalked."

"*Lycaena*.—Eyes hairy. Club of antennæ elongate. Fore-wings 6 separate 8 and 9 stalked."

So that the only difference is—"Eyes hairy" and "Eyes glabrous."

Now we find that by this startling character the species—*argiades*, *minima*, *semiargus*, *astrarche*, *phloeas*, and *dispar* constitute the genus *Chrysophanus*, whilst *boetica*, *argiolus*, *corydon*, *bellargus*, *acyon*, *icarus* and *arion* constitute *Lycaena*. Now, if the only character on which *astrarche* is put into a different genus from *icarus* is that the former has hairy eyes, and if our author does not see the possibility of one hairy-eyed genus existing in the Tribe *Lycaenidi*, and another in the Tribe *Chrysophanidi*, we would suggest that *Pararge megaera* and *P. aegeria*, having also hairy eyes, might, as there is no other test between these genera, be admitted into *Chrysophanus*.

Our author, too, shows, an utter inability to appreciate the analogy of the Pierid neurulation, as may easily be seen by comparison of his diagnosis of that of *Euchloë* with that of *Leucophasia*. In *Euchloë* he makes 6, 7 and 9 arise out of 8. In *Leucophasia*, in which the type of neurulation is identical, except that the basal branch of the sub-costal nervure does not come from the top of the discal cell, we read of 8, 9, 10 and 11 coming out of 7, and 6 being separate. The whole thing is absurd, as may be seen by anyone preparing a wing of *E. cardamines* and one of *L. sinapis*. Nothing shows more completely the superficiality of the author's work where the details are comparatively simple, and their meanings not obscured. It would be possible to go on *ad lib.* with detailed exposures of slipshod work and inaccuracies, even in the branch of study with which our author is supposed to be especially familiar, but these must suffice.

But a well-known lepidopterist said, when he was asked to review the book for the *Record*, "we want to know what the Editor himself thinks about the Nocturnes," and so probably we ought to say something about them. With the general inclusion of the *Arctiadae* we agree. In this family, which stands first, we find the *Lithosias*, *Nolas*, *Hylophilids* (including *undulatus*, *chlorana*, *bicolorana* and *prasinana*), which are followed by the *Euchromiids*, *Spilosomas* and *Arotias*. The species *miniata* and *senex* find themselves in one genus, and *mundana* in another. What affinities, we would ask our author, has *Nola* with its neighbours; or how do *undulatus* and *chlorana* get sandwiched between *Lithosia* on the one hand, and such species as *jacobaeae*, *cribrum* and *pulchella* on the other? Next to the *Arctiadae* we find the family *Caradrinidae*. Starting with *Crucellia*, we come to *Polia*. This makes a man pause. There are some of us who know a little about larvæ, but what of this—*exoleta*, *retusta*, *solidaginis*, *semibrunnea*, *socia*, *lambda*, *furcifera*, *ornithopus*, *areola*, *riminalis*, *lichenea*, *protea*, *aprilina*, *chi*, *flavicincta*, *xanthomista*! We wonder whether our author has ever had the eggs, larvæ or pupæ of *exoleta*, *semibrunnea*, *areola*, *riminalis*, *lichenea*, *protea* and *flavicincta* before him. Here are the characters of *Polia*:—"Head rough-scaled; eyes glabrous, ciliated." This, we take it, would apply to an amazing number of British Noctuids. "Antennæ in ♂ ciliated, or bipectinated with apex filiform, rarely simple." Now it appears to us that antennæ must be either ciliated, partially ciliated, or unciliated, and as our author admits moths with all these characters into this genus, he might, so far as this is concerned, put in nearly all the moth fauna of Britain. "Thorax with more or less prominent anterior and slight posterior crest." It would be easy to find some dozens of British moths that have "more or less" (a nice exact term)

"anterior and posterior thoracic crests." "Abdomen more or less crested." Need we offer a remark? Does not this first genus reduce the whole system of generic grouping to an absurdity? Not a single character that is not common to dozens of Noctuids, Geometrids, Pyralids and Tineids. These are followed with a variety of genera—*Dasypolia*, *Miselia*, *Diloba*, *Asteroscopus*, *Aporophyla*, *Heliofobus*, *Orthosia*, and here we pause again. *Orthosia*—*xerampelina*, *croceago*, *citrago*, *aurago*, *flavago*, *fulvago*, *gilvago*, *ocellaris*, *circellaris*, *helvola*, *litura*, *pistacina* (not *lunosa*, that is away with *australis*, *lutulenta* and *nigra*), *macilentia*, *lota*, *upsilon*, *suspecta*, *satellititia*. What is the affinity between *croceago* and *citrago*, between *citrago* and *flavago*, between *flavago* and *upsilon*, and between *upsilon* and *satellititia*? We confess with pain, after 25 years of hard work, that we do not know, although we know many characters which show the want of affinity. We look to see how this genus is diagnosed and expect to see "IMAGO with four wings; PUPA with hard outer case; LARVA with ten or fewer prolegs;" but no, we find again, "Head rough-scaled; eyes glabrous, ciliated. Antennæ in ♂ ciliated. Thorax with or without anterior crest. Abdomen not crested," which appears very similar to dozens of its neighbours, but without so many "ors." The *Leucanias* are followed by the *Tæniocampas* under a foreign name, and these in turn by the *Dianthæcias* under another, and so on. At last you come to a really good genus, known as *Melanchra*, Hb. This is it:—*cespitis*, *reticulata*, *serena*, *chrysozona*, *trifolii*, *dentina*, *glauca*, *conspicillaris*, *contigua*, *genistæ*, *thalassina*, *dissimilis*, *oleracea*, *pisi*, *leucophaea*, *tincta*, *adrena*, *nebulosa*, *brassicæ*, *persicariæ*, *albicolon*, *myrtilli*, *cordigera*, *melanopa*. The connection between *cespitis* and *myrtilli*, *genistæ* and *cordigera*, *nebulosa* and *melanopa*, must be patent to everybody, for the "Head is rough-scaled and eyes hairy. Antennæ in ♂ ciliated or sometimes bipectinated with apex simple. Thorax with more or less developed anterior and posterior crests. Abdomen more or less crested, in ♀ obtuse. Anterior tibiæ rarely with apical hook." Here is a very good genus, too, *Tryphaena*—*jimbria*, *ianthina*, *interjecta*, *baia*, *sobrina*, *rubricosa*, *leucographa*, *hyperborea*, *prasina*, whilst between these and our *Nonagrias*, *Heliothis* gets sandwiched. Our author's special knowledge of the Noctuids shows itself again in the genus *Caradrina*, which consists of *pyralina*, *diffinis*, *affinis*, *trapezina*, *subtrusa*, *retusa*, *oo*, *paleacea*, *unbra*, *micacea*, *petasitis*, *lutosa*, *elymi*, *fulva*, *musculosa*, *phragmitidis*, *brevilinea*, *hellmanni*, *concolor*, *morrisii*, *arcuosa*, *palustris*, *quadripunctata*, *morpheus*, *alsines*, *taraxaci*, *ambigua*, *exilis*, *trigrammica*, *matura*. These also possess "Head rough-scaled, eyes glabrous. Antennæ in ♂ ciliated, seldom bipectinated, with apex filiform. Thorax sometimes with anterior and posterior crests, usually slight. Abdomen not crested." This diagnosis wants comparing carefully with that of *Orthosia* in front. There are above 800 pages similar to this.

We have incidentally noticed the introduction of new generic names. We should be safe if we said that more than four-fifths of the generic names are new, or given an entirely new meaning. At Dotheboys Hall, we believe, little boys were told to ask no questions, and there is a good deal of Schoolmaster Squeers about these genera. If our author would tell us why these genera, and why these alterations, we can guarantee that a certain part of his audience would at least have tried to bring their intellects up to the point of attempting to understand them, but no, there they are, Take 'em— "W-i-n-d-e-r

—Clean 'em." It is too late in the 19th century for even such an authority as Mr. Meyrick to be taken this fashion.

We have already dealt with several points. In his preface our author tells us that the work "is designed to enable any student of British Lepidoptera to identify his specimens with accuracy." To the collector class, who merely want to know the names of their insects, we dare venture the suggestion that the Tables will be utterly incomprehensible. The average student will have already learned to name his moths before he has reached the point at which he would care to unravel such complicated machinery. To compare a table like that on pp. 24-25 with Stainton's simple tabulations is absurd.

We may be asked as to facts. The second species treated of is *Lithosia lutarella* (*pygmaeola*), and the erroneous information is quoted (without marks) of "saline lichens" as food for the larva. Will our author tell us how saline the lichens are on the Mendel Pass at 4,000 ft., in the Cogne Valley at 5,000 ft., or on the Croda da Lago, where the moth abounds? On the first page we opened we saw *Scoparia basistrigalis* and *S. ulmella* had been telescoped into *S. ambigua*, evidently a result arrived at from a superficial examination of the imagines; whilst we cannot conceive anything more misleading than the following about *Melissoblaptes bipunctatus*, that the "larva lives in nests of wasps, heads of *Inula*, and probably on roots, but habits hardly understood." We know this insect perhaps better than anyone else in Britain, but would not like to be so certain of any one of the facts as our author is of all. We wonder, too, whether our author ever found the larvæ of *Phycis suavelia* "in a silken gallery among leaves of blackthorn." We would also like to know where *Crambus contaminellus* is to be taken other than on the Deal sand-hills, although our author makes it inhabit "Britain to the Clyde," nor has its range, so far as we know, on the Continent yet been differentiated from that of *C. salinellus*.

But enough! The author is a bold man; he has stepped out of the beaten track; he has neglected every authority who has worked at the subject for the last half-century, and has produced a book which will please—himself. It is a one-eyed book, compiled from one narrow point of view, and one only. It ignores everything that has been done, and gives simply the author's own view of entomology, in our opinion, largely a false and erroneous one. The knowledge of the general lines on which classification must proceed is too firmly fixed for this or any other book to do much harm. The man who thinks that he can collect all the information required to set up a new scheme of classification of the Lepidoptera of the world, himself, must be looked upon as being as retrogressive as his system. Mr. Meyrick must carefully collect the tangles which Chapman and Comstock, Dyar and Hampson, Kellogg and Packard, and many others have made, and when he has got the threads in order he may have some hope of producing a book based on a system of classification not only satisfactory to himself, but to the entomological public.

---

ERRATA.—We have to apologise for the many printer's errors in the last number: p. 177 line 19—"word" should read "world," line 20—"On" should read "In," line 44—"on" should read "in"; p. 179 line 13—"revelation" should read "revelation," line 21—"unweildy" should read "unwieldy"; p. 182 line 6—"scabulosus" should read "sabulosus"; p. 185 line 23—"Dotrée" should be "Dobrée."





# The Entomologist's Record AND JOURNAL OF VARIATION.

---

VOL. VII. No. 9.

FEBRUARY 15TH, 1896.

---

## Aberrations of British Lepidoptera.

(With Plate.)

By W. P. BLACKBURN-MAZE, F.E.S.

Having had a few insects photographed for my own immediate friends and entomological acquaintances, it has been suggested that pleasure might also be given to many entomologists unknown to me personally, by having the photograph reproduced as a Plate for the *Entomologist's Record and Journal of Variation*. The labels indicate the places and dates of capture, but the following notes will be found rather more comprehensive.

*Argynnis euphrosyne*.—An aberration captured in the New Forest in 1894, in which each of the right wings has a small pale patch due to failure of the ordinary fulvous pigment. It will be observed that the patch on the hind-wing is in such a position that it would be almost under that on the fore-wing, when the insect was in the pupal stage.

*Euphrosyne janira*.—An aberration with each of the fore-wings having a pale, ill-pigmented patch; these patches are somewhat regularly placed towards the centre of the costa on the fore-wings, rather more towards the apex on the hind-wings. These again, would, owing to the narrowness of the hind-wings, be almost beneath each other in the pupal stage. The second specimen of the same species has ill-developed pigmental patches on the hind-wings only. Both specimens were captured in the New Forest in 1895.

*Boarmia repandata*.—This is an example of the well-known banded ab. *conversaria* of this species, captured in the New Forest in 1894. The ground colour is, of course, much paler than that of the type, and the band darker.

*Euphrosyne piniaria*.—A gynandromorphous specimen captured in the New Forest in 1893. The left wings are, as will be observed, of the form and with the markings which characterise the female sex, and the right pair of the form and with the markings peculiar to the male. The right antenna, too, is of the female form.—There is also a male aberration of *B. piniaria* var. *flavescens*, the yellow markings on the hind-wings restricted to a narrow dash, both on the upper and under-sides; that part of the hind-wing usually yellow is, however, rather greyer than the normally brown parts.

*Asphalia ridens*.—This represents a specimen of the comparatively rare banded form with almost white ground colour, first described by



Fabricius (*vide.*, *British Noctuae and their Varieties*, i., p. 6). It was captured in the New Forest in 1895.

*Oporabia dilutata*.—An aberration with pale ground colour and dark central band, captured at Southborough in 1890.

*Hyberria leucophaearia*.—Two forms of this common species, one the well-marked aberration, colloquially known as the "dark-banded form"; the other an extreme melanic aberration. Both specimens were captured in the New Forest in the spring of 1895.

### **Sphinx pinastri as a British Insect.**

By Rev. O. PICKARD CAMBRIDGE, M.A., F.E.S.

Under this heading Mr. Tutt gives us an abstract of all the information he is able to obtain to date, bearing on the question; and he concludes, "if anyone can show just cause and impediment why *Sphinx pinastri* should not be considered a native of our Islands, let him declare it." Whether the facts, which I feel thus called upon now to state, may or may not have some bearing on the question, I cannot say, because it would be necessary first to decide in what sense we are using the term "British," or a "native of our Islands," but, at any rate, the following facts were, I think, almost certainly not known to Mr. Tutt when he compiled his notes (*Ent. Rec.*, vii., No. 6., p. 132). I communicated them at the time to the then editor of the *Entomologist*, Mr. Carrington, who, however, beyond acknowledging their receipt, took no further notice of them; I also more recently communicated them to Lord Walsingham, in fact, just after the first captures of *S. pinastri* by Lord Rendlesham. From Lord Walsingham I received no reply at all. The facts I allude to are these: In 1880 or 1881, I cannot now be absolutely certain which, Mr. Hugo Harpur-Crewe told me that some member or members of his brother's (Sir V. H.-Crewe's) family, then residing in Suffolk, had captured specimens of *S. pinastri* in a small fir plantation in his grounds. I was naturally much interested in hearing of this occurrence, and, on what seemed to me such excellent authority, I asked him to lose not a moment in communicating the fact to the entomological journals; no such communication, however, appeared, and so subsequently, in a personal interview (in August, 1881) with Mr. Hugo Crewe, I asked why no record of it had been publicly made; he, after a little pressure, told me in effect that the occurrence was not a genuine one, but that some trickery (by way of joke) had been played in the matter. So far as I could gather, the pupæ from which the insects had emerged had been brought from the Continent, and planted for the purpose of the insect being afterwards turned up as British. When writing this to Mr. Carrington, I mentioned that although this occurrence had not been, and probably would not be published, yet it had been known and talked about in the neighbourhood where it occurred, and very possibly it would be followed by-and-bye by other occurrences in the same district. These did occur, *vide.*, *Entomologist*, 1881, vol. xiv., and 1882, xv., p. 210 (and also in subsequent years). What connection, if any, these may have had with the occurrence I have noted I cannot say; or whether the first occurrence noted by Lord Rendlesham, or that by Mr. Cooper, *Ent.*, xix., p. 14, may have had any connection with it I know not, but, at

any rate, Suffolk is not clear of an indictment for a direct, and so far successful, attempt at the early date of 1880 or 1881, to plant *Sphinx pinastri* there; and this, as it seems to me, must throw strong suspicion on the genuineness of any subsequent occurrence of the species in Suffolk. On the general question of planting British localities with Continental specimens, I have a strong opinion; but where it is done, at any rate, let us know all about it. To do it for the purpose of deceiving the entomological world is as reprehensible an act as one can well imagine; if for any other purpose, it seems to be a foolish mistake, and can hardly result in anything but confusion, and an injury to entomological science; if, however, we know the fact, we know then how we stand.

### The Genera in the Sub-family *Lycæninae* applied to British Species.

By J. W. TUTT, F.E.S.

The species included in the *LYCÆNINÆ* have long been divided into the three Tribes—*Chrysophanidi*, *Lycænidæ* and *Theclidi*. These Tribes were long since broken up into well-characterised genera by Scudder\* and other authors. British authors, however, have simply applied these tribal divisions as if they were genera, and called all the *CHRYSOPHANIDI* by one generic name (*Chrysophanus* or *Lycæna*), the *LYCÆNIDI* by another (*Lycæna* or *Polyommatus*), and the *THECLIDI* by a third (*Thecla*), and this has been done in spite of the knowledge that there are great structural differences in the ova, larvæ, pupæ and imagines of each Tribe, differences quite as important as those on which the genera of other Tribes have been based. These genera are well recognised among all but purely British lepidopterists, and to argue that species belonging to different evolutionary generic groups should be lumped under one name because we have so few species in Britain is not only absurd, but insulting to the intelligence of the British lepidopterist, who is tacitly assumed to be less capable of understanding the subject he studies than are foreign lepidopterists. To suppose that all British lepidopterists do not recognise the differences between *Zephyrus betulae* and *Thecla w-album*, between *Cyaniris argiolus* and *Polyommatus corydon*, etc., from their earliest entomological infancy, is ridiculous.

In order to get a working system I have attempted to correlate the genera used by Scudder and Kirby. I disagree absolutely with the manner in which many names, often without description, have been resurrected by them, and changed from their original uses, but to find a working basis have accepted their conclusions, and attempted to understand their differences. Both authors appear to work on similar lines, and yet in going over the same facts, the personal equation results in a disagreement in five cases out of eleven. I am much obliged to Mr. Kirby for a very full explanation of his position, and for the facts on which the work relating to this subject, in his 2nd vol. of the *Naturalists' Library* is based, but even on his own rule propounded as follows:—“If no type is specified by the original author, or fixed by later use, then I hold that the last species not taken out of the genus, to be placed in a later one, is the ‘residuary type,’ provided that it does

\* *Butterflies of New England*, Scudder. Cambridge, Mass.

not contradict the original name or description," I would maintain that Scudder's choice of *Everes* for *argiades* is well-founded, that *minima* becomes the type of *Cupido*, and that *arion* is undoubtedly the "residuary type" of *Lycaena*.

The following will give the more advanced British lepidopterists the information as to the genera included in the British LYCÆNINÆ, with the various species belonging to each; so far as the material at hand will allow.

- I. Tribe: THECLIDI.—(1) *Thecla*—*pruni* and *v-album*.  
 (2) *Zephyrus*—*betulae* and *quercus*.  
 (3) *Callophrys*—*rubi*.

*Thecla* is apparently unquestioned.—*Zephyrus*, Hb., is antedated by *Ruralis*, Barbut, but Mr. Kirby considers Latin adjectives inadmissible.—*Lycus*, Hb., is older than *Callophrys*, Billberg, but is preoccupied in Coleoptera.

II. Tribe: LYCÆNIDI.—

- (1) *Lampides*—*boetica*. (2) *Cyaniris*—*argiolus*.  
 (3) *Polyommatus*—*corydon*, *bellaryus*, *icarus*, *astrarche*.  
 (4) *Nomiades*—*semiargus*.  
 (5) *Everes*—*argiades*. (6) *Cupido*—*minima*.  
 (7) *Plebeius*—*aegon*. (8) *Lycaena*—*arion*.

The first four of these are, I believe, unquestioned.—In *Cupido*, Schrank gives short descriptions of several Blues, with a long one of *argiades* and *minima*, which he considered the sexes of one species (*Cupido puer*). Hübner constructed the genus *Everes* for *argiades*, and by this restriction appears to have left *minima* as the type of *Cupido*; Moore recently devised *Zizera* for the *minima* group. Kirby lets *Everes* fall, and retains *Cupido* for *argiades* and *Zizera* for *minima*.—*Plebeius*, Linn., and *Rusticus*, Hb., have both been selected for the *aegon* group. Kirby chooses the older and Scudder the newer name.—*Lycaena*, Fab., was a mixed genus for Coppers and Blues. All the Coppers and Blues except *arion* have since been placed in special genera; *arion* becomes, therefore, what Mr. Kirby would term the "residuary type" of the genus.

III. Tribe: CHRYSOPHANIDI.—(1) *Chrysophanus*—*dispar*, *phloetas*.

Certain typical Coppers were included in *Lycaena* with certain Blues. The former were taken out and placed in *Chrysophanus*, leaving the Blues in *Lycaena*. These have all been transferred to various genera, except *arion*, which is therefore the "residuary type" of *Lycaena*, as before shown. I am unable to agree yet that *phloetas* is generically distinct from the other Coppers. Scudder treats it as being so under the title of *Heodes*.

There can be no excuse now for any scientific British lepidopterist not using the correct generic name for the British Hairstreaks, Blues and Coppers in his communications, either to the Societies or to the Magazines.

### On the variation of certain Noctuides occurring near Montrose.

By MONTAGU GUNNING, M.D.

*Taeniocampta gothica*.—This insect in its typically marked forms varies in colour from greyish-white to pale reddish-grey, whilst in our obsoletely marked aberrations only two occur, *obsoleta-rufescens*, Tutt, and *obsoleta-variegata*, Tutt. I had always been under the impression that these were *gothicina*, but I understand now that this is a very unusual form in Scotland, the true ab. *gothicina* being of a red ground-colour, the gothic mark being also reddish, but of a paler hue than the ground-colour. Mr. Tutt informs me that the Scotch dealers used erroneously to refer all obsoletely marked aberrations to ab. *gothicina* for sale purposes, and afterwards the collectors made the same error in their exchanges.

*Noctua glareosa*.—The type is of an ashy-grey colour (*British Noctuae*, etc., vol. ii., p. 108) with black markings; ours are often more red than black. We get none of the very pale forms, such as I am informed occur at Sligo and some other localities, although ab. *hebraica*, with the space between the two outer transverse lines of a dark grey colour, does. The best of our aberrations are the dark examples, culminating in their extreme forms in ab. *suffusa*, Tutt (*Brit. Noct.*, etc., ii., p. 108). These lead up from a normally dark slate-grey form, gradually losing the grey and assuming a blackish hue, with pale and very distinct transverse lines, until they become quite melanic. The mahogany hue, seen in some of these dark specimens, is due to the red, which is typical of ab. *rosea*, being combined with the dark ground-colour. Most of our dark specimens are of a dark blackish-grey hue, and not the "rich dark brown colour," which Mr. Jenner Weir says is characteristic of the Unst specimens, but this year several of these dark mahogany forms appeared.

*Xylophasia rurea*.—In *The British Noctuae and their Varieties*, Mr. Tutt describes several aberrations of this species, and for some time I considered that our dark forms were the ab. *combusta*. *Combusta*, Haw., however, although a dark reddish-brown form, has the reniform stigma outlined in white, a form I have never seen; the ab. *combusta*, Hb., with a reddish costa and ochreous markings, does appear here not uncommonly; the darkest form, however, which I at first considered to be *combusta* is undoubtedly the ab. *nigro-rubila*, described by Mr. Tutt from Hebridean specimens. Of the pale section we get the type with a broad pale (and in some specimens almost pure white) inner margin, and also ab. *ochrea*.

*Dianthoea conspersa*.—All the *D. conspersa* we take are identical with the ab. *suffusa*, Tutt. The type does not occur here.

*Miselia oxyacanthae*.—Our specimens are lighter than the type, especially the terminal band, and have much less green, so that they seem to be between the type and what Mr. Tutt calls ab. *pallida*. They are not the latter, as they have streaks of green near the costa and centre. In fact, ours is a light form of the type, with less green than usual, and a paler terminal band.

---

## Reminiscences of the Tyrol.

### II. A JULY HOLIDAY.

By FREDERICK C. LEMANN, F.E.S.

In previous seasons, trips to the Basses-Alpes and other parts of Southern France, the Pyrenees, Corsica, the Engadine, the Italian Lakes, the Bernese Oberland, Hungary, etc., had all been fraught with much interest, and had rendered me familiar with a very respectable percentage of the European Rhopalocera; but this summer I decided upon paying a visit to the Austrian Tyrol. By great good luck I managed to secure the companionship of Dr. T. A. Chapman, so that I was enabled to visit a country quite unknown to me, and practically so to my travelling companion, under most favourable auspices.

Leaving England on the morning of the 6th July, we travelled straight through to Zurich, resting there one night, and travelling on

next day to Innsbruck *via* the Arlberg route. At Innsbruck we had time to admire some of the sights of that most beautifully situated and interesting town, and then on next day, by rail, over the Brenner Pass to Botzen. Here we left the railway, and travelled by a species of diligence to Mendel. This drive is extremely interesting, the road on leaving Botzen passes through a long series of vineyards for some distance, and then ascends by a succession of zigzags to the summit of the Mendel Pass (4,440 ft.); the views in ascending are truly magnificent as the traveller looks across the Grödener Thal to a grand range of Dolomite mountains, some snow-capped, others huge masses of apparently bare rock, varying much in contour and colour. We stayed at Mendel some days, but I do not intend to enter into any description of the collecting in that particular locality, as an abler pen than mine has already described our sport; Mr. Tutt having joined us there on our return.

Our route from Mendel was by carriage, *via* Cavareno to Dimaro, in the Val di Sole, a small hamlet where we passed the night, going next day to Pejo, another small village lying in the Val di Pei, and situated immediately under the giant Ortler group of mountains.

Our first day's collecting here was encouraging, for by following the right bank of a mountain stream we soon made the acquaintance of such insects as *Melitaea maturna*, *Argynnis thore* and *Carterocephalus palaemon*, besides commoner species. The following day we worked up to higher ground, where we found in fair abundance *Erebia lappona*, *E. tyndarus*, *Melitaea cynthia* and *Lycaena orbitulus*, flying over the short turf; but a greater prize was in store for us in *Oenets aëlo*, which insect appeared to haunt the bare rocks at the foot of precipices, flying much in the same manner, and settling occasionally on stones, as does our own *Satyrus semele*. From Pejo we returned to Dimaro, and having placed our luggage on the back of a mule, started on foot for Campiglio, a very hot up-hill grind of some four hours on an abominably rough mule-path. Campiglio itself, an old monastery now turned into a hotel, lies at the top of a pass at an elevation of 4,960 ft., and is singularly interesting and beautiful in its surroundings. Our collecting there extended over a considerable tract of country, some in fine open flowering glades in the pine forests, where we found *Lycaena alcon* flying over the flowers in company with *Erebia tyndarus*, *Argynnis ino*, *Erebia euryale* and others. Mounting higher on the mountain slopes, we met *Colias phicomone*, *Erebia lappona*, *Erebia gorge* var. *triopes*, *Argynnis pales* and its variety *napaea*, but our greatest prize was *Erebia melas*. This insect, familiar to Pyrenean collectors, was not known to inhabit the Tyrol until an English lady, Mrs. Nicholl, captured it in 1890, and to show how, at the present day, the Germans are unconscious of Mrs. Nicholl's discovery, I may mention that a German entomologist from Dresden, who was collecting on the same ground with us, insisted upon the butterfly being *Erebia glacialis* var. *pluto*.

*E. melas* has a singularly unpleasant habit of flying only on very steep slippery rubble banks at the foot of sheer precipices; running after it is an obvious impossibility, and the only course is to struggle painfully up some 30 or 40 yards, and sit down waiting for a chance of it coming within range of the net, or else laboriously creeping after one which has chanced to settle on a stone; even then capture

was by no means easy, as the wily insect would take advantage of the uneven character of the ground to escape under the ring of the net, or else dive down amongst the loose stones and disappear for good. However, by hard work we managed to secure a fair series at the cost of sundry abrasions and considerable damage to our clothing.

Mr. Elwes, I recollect, in his description of his experiences in the Pyrenees, which appeared in the *Transactions of the Entomological Society of London* for the year 1887, speaks of the difficulties attending the capture of *E. melas*. One striking feature in the Rhopalocera of the Tyrol is the comparative scarcity of *Lycaenidae*, a group so numerously represented in the Swiss Alps, although on the other hand, we took *L. argiades* ab. *coretas*, which is, I believe, not found in Switzerland. A list of our captures may be of interest to collectors of the European butterflies:—

*Papilio podalirius* and *P. machaon*, not uncommon; *Parnassius apollo*, abundant; *P. delius*, scattered specimens above 6,000 ft.; *Aporia crataegi*, abundant; *Pieris brassicae*, *P. rapae* and *P. napi*, also abundant; whilst of *P. napi* var. *bryoniae*, a few specimens were obtained at Campiglio; *P. callidice*, not uncommon at high elevation; *Euchloe cardamines*, one or two belated specimens; *Leucophasia sinapis*, abundant, with two specimens of ab. *erysini*; *Colias phicomone*, abundant; *C. hyale* and *C. edusa*, fairly common; *Gonopteryx rhamni* and *Thecla spini* were also somewhat common; *Thecla rubi*, a few worn specimens; *Polyommatus virgaureae*, not abundant; *P. hippothoe*, one specimen, but its var. *eurybia*, fairly common; *P. alciphron* var. *gordius*, not abundant; *P. dorilis* and *P. phloea*s fairly abundant; *Lycaena argiades* ab. *coretas*, not common; *L. aegon*, abundant; *L. argus*, fairly abundant; *L. optilete*, rare; *L. orbitulus*, a few specimens high up; *L. astrarche*, not very abundant; ab. *allous*, one or two specimens; *L. icarus*, common; ab. *icarinus*, pretty common; *L. bellargus*, not common; *L. hylas*, scarce; *L. corydon*, abundant; *L. eumedon*, scarce; *L. argiolus*, not common; *L. semiargus* and *L. minima*, common; *L. arion*, fairly common; *L. alcon*, scattered specimens at Campiglio; *Libythea celtis*, fairly abundant at Mendel; *Limenitis camilla*, fairly common; *Vanessa c-album*, *V. polychloros*, and *V. urticae*, common; *V. io* and *V. antiopa*, fairly common; *Pyrameis atalanta*, also fairly common; *P. cardui*, worn specimens only; *Melitaea aurinia* var. *merope*, common, over 6,000 ft.; *M. maturna*, in fair numbers at Pejo; *M. cynthia*, moderately abundant, over 6,000 ft.; *M. didyma*, pretty abundant; *M. phoebe*, not abundant; *M. parthenie*, not abundant; *M. dictynna* and *M. athalia*, abundant; *Argynnis paphia* and *A. aglaia*, common; *A. adippe*, not so common; ab. *cleodora*, a few specimens; *A. niobe* ♀, much rarer than its ab. *eris*; ab. *eris*, abundant at Mendel; *A. lathonia*, fairly common; *A. euphrosyne* and *A. selene*, a few worn specimens; *A. pales*, common, var. *napaeae*, not scarce; *A. amathusia*, common; *A. daphne*, two specimens at Mendel; *A. ino*, fairly common at Campiglio; *A. thore*, fairly common at Pejo; *Melanargia galatea*, common; *Erebia melampus*, abundant at Mendel, etc.; *E. mnestra*, fairly common in the same localities; *E. oeme* var. *spodea*, fairly common at Pejo, Mendel, etc.; *E. ceto*, scattered specimens; *E. nerina*, common at Mendel; *E. melas*, not uncommon near Campiglio; *E. lappona* and varieties, *E. tyndarus*, *E. gorye* ab. *triopes*,

fairly common at the higher elevations; *E. pronce* var. *pitho*, just emerging at Campiglio; *E. aethiops*, fairly common; *E. ligea* (Zurich), two specimens; *E. euryale*, abundant in S. Tyrol; *Oeneis aëlle*, fairly common at Pejo and Campiglio; *Satyrus hermine*, fairly common; *S. circe*, not common; *S. semele*, abundant; *S. actara*, one specimen only; *Pararge maera*, abundant; *P. megera*, fairly common; *P. egeria*, not common; *P. achine*, abundant at Mendel; *Epinephale hyperanthus*, a few specimens; *E. janira*, abundant; *E. lycaon* and *E. tithonus*, fairly common; *Coenonympha pamphilus*, abundant; *C. arcania*, common; var. *darwiniana*, one specimen; *Spilothyrus althaea*, abundant; *Syrichthys carthami* and *S. alveus* abundant; *S. malvae*, *S. sao* and *Nisoniades tages*, a few only; *Thymelicus thaumas*, *Pamphila sylvanus*, *P. comma*, abundant; *Carterocephalus palaemon*, two specimens at Pejo. In all 115 species.

### On the Affinities of *Demas coryli*.

By J. W. TUTT, F.E.S.

Whether *Demas coryli* is a Noctuid or a Lymantriid (Liparid) has become a burning question, owing to the directly opposed views held, as to facts observed, by Dr. Chapman and Mr. Harrison G. Dyar. In the *Journal of the New York Entom. Society*, vol. iii., pp. 130—131, Mr. Dyar writes:—"Professor E. B. Poulton has shown that dorsal eversible glands are of general occurrence throughout the larvæ of the *Lymantriidae* (*Trans. Ent. Soc. Lond.*, 1887, p. 300) on the tenth and eleventh joints, or rarely on the eleventh joint (*Dasychira pudibunda*). Probably these structures are characteristic of the family, but Prof. Poulton did not find them in *Demas*. This genus has been considered to belong to the *Noctuidae*, but English authors assume it to be a Lymantriid. Mr. J. W. Tutt remarks, in speaking of Prof. J. B. Smith's recent "Catalogue of the Noctuidae" (*Entom. Record*, etc., vi., p. 70):—"The obsolete position of *Demas* among the *Noctuidae* is retained. Now is this position 'obsolete'? The absence of the retractile tubercles certainly throws doubt on the matter. Now I have shown a characteristic difference in the arrangement of the thoracic tubercles between the *Lymantriidae* and *Noctuidae* (*Trans. New York Acad. Sci.*, xiv., p. 57), and *Demas* shows the Noctuid structure. Therefore, in all essential larval characters, *Demas* is a Noctuid. It might, indeed, be an Arctian, as far as the larva goes, but not a Lymantriid. As concerning the structure of the imago, *Demas* seems to have greater affinity with the *Noctuidae* than any other family. In fact, it appears to me that the placing of *Demas* among the *Lymantriidae* may properly be characterised as premature." Further, Mr. Dyar writes:—"The pupa is shining dark brown, with a large wrinkled cremaster, and three movable incisions. Of the usual Noctuid appearance (quite unlike *Orgyia*), and passing the winter." This statement about the pupa wants careful comparison with Dr. Chapman's remarks thereon, which are quoted below. Now, we would call Mr. Dyar's attention to the following statements, made by Dr. Chapman. He writes:—"We now come to two species, *Demas coryli* and *Diloba caeruleocephala*, that are certainly not very much related to each other, and though they have some indications of affinity with *Acronycta*, are

not near enough to be placed in the same family. *D. coryli*, I should certainly restore to its old place in the *Liparidae*, to which it is closer than to the *Acronyctas*. . . . But neither of these seems to me to be nearer to *Acronycta* than is *Arctia*, or *Liparis*, or *Orthosia*, or *Xylina*, which appear to be perhaps the families nearest to *Acronycta* in different directions" (*Entom. Record*, vol. iii., p. 249).

Dr. Chapman then gives (*Ibid*, pp. 249—251) a most exact and scientific description of the egg, the newly-hatched larva, the larva after each moult, and the pupa of *D. coryli*, annotating his description throughout by comparison with the *Liparidae* (or *Lymantriidae*, as the American lepidopterists appear to call this family).

After thus exhaustively dealing with the structure of *Demas* in its various stages, Dr. Chapman concludes:—"The larva of *D. coryli* is clearly a Liparid, not therefore, perhaps, so very remote from *Acronycta*, but still, distinctly a Bombyx (if that name still have a definite collective meaning), and not a Noctua. The pupa of *D. coryli* is not that of a Noctua, though the character of the anal armature bears some resemblance to various Noctua forms" (*Ent. Record*, vol. iv., p. 97). The newly-hatched larva is excellently drawn and figured on Pl. ix., fig. 2, of the same magazine, where it is  $\times 20$  diameters, and where comparison can be made with the allied forms figured on the same and the preceding plates, especially with the *Acronyctids*, with which it has been suggested to have certain affinities. The pupa is also figured on the same Plate (fig. 5, pupa, nat. size; fig. 5a, showing dorsal view of armature; fig. 5b, showing ventral view of armature; fig. 5c, showing lateral view of armature; the last three figs.  $\times 15$  diam.).

We should surmise, from Mr. Dyar's silence thereon, that he is entirely unacquainted with Dr. Chapman's writings on *Demas coryli* in the earlier volumes of the *Ent. Record*, and that he has not made himself conversant with the detailed account of the species written by Dr. Chapman. If this be so we shall feel inclined to retort that Mr. Dyar has been "premature" in his criticism of the position which we took up when criticising the position assigned by Prof. Smith to the genus in his recent list. It appeared evident to us from this and other details that Prof. Smith was quite unacquainted with Dr. Chapman's authoritative work on the alliances of certain Noctuid species; or, if he were, it surely is due to one of the foremost of British lepidopterists, that Prof. Smith should give us some reason for neglecting, in his recent *Catalogue*, the conclusions at which Dr. Chapman has arrived. For the rest we are quite satisfied that the latter will be able to maintain his position. His work is too thoroughly done to tumble down at the first breath of straightforward and honest criticism. [We have forwarded a proof of this to Dr. Chapman, and append his remarks.—ED.].

THE AFFINITIES OF *DEMAS CORYLI* (by T. A. Chapman, M.D., F.E.S.).—My examination of this species was entirely with reference to its alliance with *Acronycta*, and I had no hesitation in deciding that it had no alliance with that family. To assert with any confidence that it belonged to the Noctuid or to the Liparid would have involved a research into those families that I had not undertaken. Still, I had little doubt it was rather a Liparid than a Noctuid.



My examination of *Acronycta* showed that *Acronycta* was a Noctuid group, but had very strong Arctiid affinities. *Demas coryli*, I should say, was a Liparid with strong Noctuid affinities.

Mr. Meyrick has placed before us markedly a conclusion I had independently arrived at, viz., that the MACRO-HETEROCERA with eggs whose micropylar axis is placed vertically when the egg is laid, form one group. His position for NOTODONTIDÆ is unfortunate from this point of view, but this by the way. ARCTIIDÆ are closely associated with NOCTUÆ, so also are LIPARIDÆ, the association of LIPARIDÆ with ARCTIIDÆ is more remote. The result is, therefore, that a dispute as to whether *Demas coryli* is a Noctuid or a Liparid is not so much a question of fact as a question as to where it will please you to draw the line between the two groups.—January, 1896.

---

### On Breeding *Sphinx convolvuli*, with some account of its Larva.

By W. T. STURT.

I received from Cornwall seventeen larvæ of *Sphinx convolvuli*, which were found by a fisherman named Pengelly at Port Wrinkle, Whitsand Bay. These came to hand as follows:—Four on the 19th, and thirteen on the 26th of October last. Of these five died, two I gave to a friend, ten went to earth, and I obtained seven healthy pupæ, but four of them are, I should think, decidedly small. The larvæ varied in size and colour very much—the brown form (in those just changed into the last skin)—from almost black, with continuous white stripes along the side, to two (full-fed), which were of a pale putty colour with very faint markings. The green form varied from a rather deeper tint than that of *S. ligustri*, with oblique black stripes bordered with white, to a very washy shade, with the black stripes broken up into three dots of pale brown. One of those I received on October 19th went to earth the same day, and the last of all on the 17th of the following month.

The larvæ were sluggish, but good feeders, seldom moving unless in search of food. When disturbed they twisted the head sharply to one side, and I particularly noticed, when changing their food, that they would quickly let go their foothold; in fact, showed a decided tendency to drop off. In a state of nature, feeding as they do, on a plant so near the ground, no doubt even a heavy caterpillar might not suffer injury. That they avoid sunshine, and hide during the day, I am convinced is not the case, for they seemed to prefer feeding in the sunshine if I placed them there, and would feed freely by gaslight.

In pupating I found they had all “buried” to a depth of about eight inches, though the pot was a large one, and they could have gone down at least another four inches. They had formed particularly large earthen cavities, in which I found the pupæ remarkably active, very soft and delicate looking, and of a pale reddish shining brown colour. The head and wing-cases very transparent. I placed one pupa in a forcing apparatus on December 1st, and a second on December 3rd; the first died after appearing well and active for ten days. I did not observe any alteration in the second until December 13th, when I noticed the eyes and proboscis decidedly darkening; on the 17th still more so, and legs and antennæ also

darkening, also the wings at the shoulders. On the 19th the body had also changed colour, and the wing-cases, legs and antennæ became very dark, and the eyes quite black. On the 20th the whole pupa had further changed colour, and the following day at 12 o'clock the imago emerged, crippled I am sorry to say, and with a portion of the chrysalis case adhering to the body. The skin of the pupa, when dry, I found to be as thin and almost as transparent as gold-beater's skin. Would one suppose it possible that such a delicate pupa could survive our ordinary winter, and if so, could the very large cavity the larva forms to pupate in assist in preserving it?

On the 14th I placed three more pupæ in the apparatus, and they remained alive and active. On the morning of December 24th, I noticed in all three of them the alteration in colour of the eyes and proboscis before mentioned. I may mention that to test the apparatus, I put in, on November 27th, a pupa of *S. lipustri*, and found the heat made it very active by the third day—it is now alive and kicking—but I cannot discern much change so far, through its thick skin.

Of the three pupæ placed in the pot on the 14th of December, one, a male, emerged on the 29th at 1 a.m., another, a female, the following morning at 5.30 a.m., the third, also a female, on January 1st, crippled in all but the left fore-wing.

The specimens are smaller, but greyer and brighter than those (D'Orville's) I already had, and the darker markings are more pronounced.

The remaining two pupæ of *S. convulvuli* I had kept on damp moss beneath a bee-glass, in a room in which there has been a fire daily, intending to leave them there until the summer; but on finding one dead on January 9th, I decided to force the surviving one, and proceeded to do so on January 12th. I observed—as in the case of the preceding ones—that the change commenced exactly on the tenth day, and a perfect female emerged on January 29th. Result: bred one male, four females—of which two are crippled and two pupæ dead.

---

## The Relationship of *Endromis versicolor* to the Sphingides.

By A. BACOT.

My interest in this species has been increasing for some years. Entomologists of my acquaintance, who have reared it from the egg, have tantalised me by describing the interesting changes which occur during the development of the larvæ. From their remarks and descriptions I had always thought of it as either a misplaced Notodont, or at least a near ally of this group. I was, therefore, rather surprised when Mr. Tutt, in discussing my paper on *Smerinthus*, alluded to *E. versicolor* as a probable relative of that genus. Mr. Tutt's remarks still further increased my desire to breed it, so that when Mr. Battley mentioned that he had eggs of this species, I intimated that he might "supply a long-felt want," and our secretary, with his usual kindness, gave me some newly-hatched larvæ.

Fortune and, as will be seen later, misfortune also, seldom come singly; an offer of eggs from Mr. Clark was therefore hardly a surprise. Unfortunately, these eggs, although without doubt fertile (one larva having emerged before I received them), did not hatch, and even the choicest birch that Epping Forest produces could not tempt the

larvæ I already had to live beyond their third moult. Their premature decease was very disappointing, still I was able to examine them during the most interesting period of their ontogeny. My notes on the larvæ, which I have curtailed as much as possible, are as follows :—

**FIRST SKIN.—Head.**—Large and rounded, dull black with a few fine whitish hairs on it. **Body.**—Of even thickness, segments distinct, colour black, scutellum yellow, bearing a few small hairs in two patches, legs yellow, anal flap brownish. There is a tall fleshy tubercle or short horn on segt. 12. A double dorsal row of tubercles (? trapezoidals) and a well-marked sub-dorsal (? supra-spiracular) row extend from segts. 3 to 13, but the tubercles on the lateral area are not so distinct as the dorsal ones.

Each of the dorsal (and other large tubercles) bears a small group of five or six hairs, and I fancied that the hairs from the lateral tubercles on segt. 2 were slightly stronger than on the other segments, but as I had been examining this feature in the larvæ of the *Liparidae*, it may have been due entirely to my imagination; at any rate, the difference, if any, was very slight. The plan of the tubercles reminded me rather of that I had noticed in the Noctuids, with the addition of some small extra ones without regular arrangement. Hairs arise solely from the tubercles; they are stiff, short, slightly curved, and quite simple, with the exception of a knobbed or bulbed appearance at the tip. For some days previous to their first moult the oblique stripes were visible through the skin, and the short horn was more noticeable.

**SECOND SKIN.—Head.**—Large, rather square than round, division between lobes distinct, colour light yellow with a brown bar down either side. **Body.**—Pale green, scutellum plain with a broad longitudinal bar on each side. Horn is larger. The large tubercles, each bearing a group of hairs, have entirely disappeared, and are replaced by very small black ones, which are thickly scattered over the body, giving it a shagreened appearance. Each of these small tubercles bears one short hair with a slightly enlarged tip, which in some cases is notched (suggesting the bifid hairs of *Smerinthus*). There is a thick black dorsal line, apparently caused by the spreading of the black colour from the bases of the tubercles, and in addition a broad yellow lateral band starts on either side of the head, which is continued backwards to the end of segt. 4. The oblique stripes are seven in number, no. 7 being the strongest; they slope backwards (*i.e.*, in the opposite direction to those of *Smerinthus*), and there is also a short stripe down the sides of the horn. The lateral stripes are distinctly coloured, while the oblique ones are caused only by the absence of the small black tubercles from the area of the stripes. On either side of the dorsal line there is what appears at first sight to be a row of large, flat, dark-coloured tubercles; closer examination, however, proves them to be only dark spots, caused like the dorsal line by the spreading of the colour from the bases of the tubercles.

**THIRD SKIN.**—This moult produces but little change in the general appearance. **Head.**—Not so large proportionally; bars down the sides narrower. **Body.**—Scutellum not so plain. Dorsal area is now of a creamy colour faintly tinged with green, lateral and ventral surfaces being bright green. Small black tubercles are still thickly sprinkled on the ventral and lateral areas, but they fade away towards the back

of the larvæ, and become mere specks on the dorsal area; each still gives rise to a short, stiff hair, but I could not see whether the hairs were still notched, as it required a high power ( $\frac{1}{4}$  inch), and the larva would not keep still. Horn more developed and not so thick. Dorsal line still distinct; it can be traced from head to anal flap; on most of the segments it is of a dark transparent green, but where it crosses the scutellum and horn it gives place to black, and there are traces of the same change of colour where the line crosses the thoracic segments. The yellow lateral lines are very plain, the sub-dorsal ones, which only crossed the scutellum in the last skin, are now continued backwards to segt. 4. Oblique stripes are much stronger, broadest on the sub-dorsal area, and, though faint and narrow on the sides, they are continued downwards to the claspers. The 7th is much stronger than the rest, the short one down the sides of the horn being also very plain. Anal flap outlined with yellow. There is a dark border to the upper portion of the oblique stripes, apparently caused by the encroachment of the green from the sides upon the dorsal area.

My notes on the larvæ finish abruptly here; one larva underwent a third moult, but I was busy preparing for a Whitsun excursion to the New Forest, and had not time to examine it, and ere my return it had joined the majority. Nothing very definite was suggested by the newly-hatched larva as regards relationship to other species. In general appearance it reminded me somewhat of a freshly-emerged larva of one of the larger *BOMBYCIDES*, while the short horn suggested that of a young larva of *Lasio-campa quercifolia*, and I could detect nothing which was specially characteristic of either *Smerinthus* or *Notodonta*. A startling change, however, was produced in its appearance at the first moult; for a dark-coloured and rather hairy larva, which might reasonably have been expected to develop a coat like that of *Bombyx rubi*, changed to a vivid green, and, to the naked eye, smooth larva. The large tubercles, each bearing several hairs, were replaced by minute black tubercles, each surmounted by one short hair slightly clavate at the tip. These and other characters irresistibly reminded one of *Smerinthus*, although the resemblance was of a somewhat Chinese or topsy-turvy kind. Thus the oblique stripes slope in the opposite direction, and are formed, *not* by the massing together of the tubercles, as in *Smerinthus*, but by their being *absent* on the stripes, and plentiful everywhere else. That these characters only develop after the first moult would seem to intimate a relationship to *Sphinx* rather than to *Smerinthus*. What is probably an important point of resemblance is the strength of the seventh oblique stripe, as compared with the others, this feature being present in all the British species of *Smerinthus*, while the horn on segt. 12, though short and not very similar in appearance, is not altogether devoid of significance. Other characters common to both larvæ will be seen from the tables I have drawn up.

With regard to habits, I did not notice any that seemed to bear on its relationship. When young the larvæ are gregarious, but this habit is common to many widely-separated species (such as *Ulisio-campa castrensis*, *Vanessa urticae*, *Phalera bucephala*, etc.). They rest with their heads turned back, and if disturbed they all jerk in concert. The first of these habits, if my memory does not play me false, is common to other gregarious larvæ, and the jerking is, I believe, almost universal with social larvæ.

Just recently I have obtained two or three pupæ of *Endromis versicolor* (which I now exhibit with those of *Smerinthus tiliae*, *S. populi*, *Choerocampa elpenor* and *Saturnia carpini*), and upon comparison with those of *Smerinthus* and *C. elpenor*, they will be found to agree in many respects, *S. tiliae* being nearest in general appearance, though in some special features *C. elpenor* seems to be even closer; a very noticeable difference between *E. versicolor* and these two species being the growth of stout bristles on the cremaster; in this it resembles *S. carpini*, which you will notice has a similar development of bristles on the cremaster.

(To be continued).

### On the Variation of *Melitæa aurinia*, Rott.

By W. F. DE VISMES KANE, M.A., F.E.S.

The article by Mr. Tutt under the above title is, I fear, in one point, at least, likely to confuse still further the rather difficult question of the identification of var. *hibernica*, Birchall. The writer treats it as probably synonymous with my var. *praeclara*. In my notice of this *Melitæa* (*Ent.*, vol. xxvi., p. 157), starting with the fulvous type of Rottemburg, I define the var. *praeclara* as distinguished from it by a straw-coloured band, and very vivid fulvous blotches, corresponding with certain of Hübner's figures. This is a very handsome form in Ireland; and is common, though generally duller in tint, in Great Britain.

Intermediate between these is a local form, *signifera*, "a transitional form," characterised especially by the italicised words in the description. This would seem to have been substituted for var. *praeclara* by Mr. Tutt. I then proceed to deal with those forms in which the black ground predominates largely, namely, vars. *scotica* and *hibernica*. The vague terms, and two errors in Birchall's description of the latter, probably misled Mr. Tutt, who may not have referred to a plate which was published in the *Ent. Monthly Magazine*\* vol. x., pl. 1, which fixes more accurately the form intended. The errors in the Latin definition of var. *hibernica* are, firstly, the one alluded to by Mr. Tutt, that the straw-coloured band, etc., on the hind-wings of the female are retained (as in the figure), and not obliterated, as in part of the description. And secondly, the substitution of the word "fulvis," instead of (?) stramineis, in the description of the male hind-wings: the character intended to be noted being the partial or entire suppression of the straw-coloured lunular marginal patches.

A reference to the plate will show what I pointed out, that var. *hibernica* is only an extreme aberration of var. *scotica*, as described by me (*loc. cit.*, p. 187). The question, then, becomes narrowed as to whether Birchall's variety described from only a few examples should stand as an aberration, or whether [if we adopt Mr. Tutt's dictum that "Descriptions of varieties (local races) must be considered as a whole rather than in detail"] we should retain the name *hibernica* for the Scotch and Irish forms with very predominant black ground,

\* This was published privately and not with the *Ent. Mo. Mag.* We have no plate in our copy of the *E. M. M.*, vol. x., and should be glad to purchase it from any one who has a duplicate plate.—Ed.

and sink the more recent var. *scotica*. But as Birchall lays stress on the difference between it and the Irish variety, I have adopted the former alternative. In the plate above referred to a Scotch *aurinia* also is represented, but the figure is so ill done that it is doubtful what was intended, especially since Birchall, in commenting on it, states that it approximates to var. *merope* (with small buff patches, the fulvous colour being retained generally only in the ante-marginal series of the hind-wings). This certainly is not the var. *scotica*. Perhaps those who have a good series of Scotch *M. aurinia* will compare them with Birchall's two figures of var. *hibernica*, and state if they approximately represent the major part of the dark Scotch forms; or, if not, whether aberrations occur similar to them. If they are sufficiently near to serve as the type, we must set down the Scotch race as var. *hibernica*; but, if not, the name can stand as an aberration, and most dark Irish specimens will rank under var. *scotica*.

## VARIATION.

THE DARK FORM OF HYPsipetes elutata ON SALLOW.—I can corroborate Dr. Ridg's statement (*ante.*, p. 143) that the black form of *H. elutata* occurs on willow, as it used to be common on that tree in Carmarthenshire, in company with a great variety of other forms, with endless intermediate specimens.—N. M. RICHARDSON, B.A., F.E.S. *January, 1896.*

THE VARIATION OF XANTHIA FULVAGO.—As is well-known, there are two very distinct shades of ground colour presented by the forms of *Xanthia fulvago* (*cerago*) occurring in these Islands. Each of these may be looked upon as giving us in its markings four groups, (1) with dark purplish markings, (2) with bright red markings, (3) with very faint markings, (4) with only central spot. These give us the following table, as extracted from *The British Noctuae and their Varieties*, vol. iii., p. 10.

1. Pale yellow, with lower part of reniform forming a dark spot=ab. *flavescens*, Esp.
2. Pale yellow, with indistinct red markings=ab. *cerago*, Fb.
3. Pale yellow, with distinct red markings=fulvago, Linn.
4. Pale yellow, with purplish-red band=cerago, Newman=ab. *suffusa*.
5. Orange-yellow, with central spot=ab. *obsolata*.
6. Orange-yellow, with indistinct red markings=ab. *imperfecta*.
7. Orange-yellow, with distinct red markings=ab. *aurantia*.
8. Orange-yellow, with distinct purplish-red band=ab. *virgata*.

In the hope of discovering the distribution of these various forms, I have obtained the following preliminary notes:—

Mr. H. J. Turner, F.E.S., writes:—"The forms I get may be classified as:—1.—Pale yellow form, with red markings=fulvago, Linn.—I have, until this year, bred only specimens of this tint from various parts of Surrey, and from Horsham (Sussex). 1a.—Pale yellow, with central spot=ab. *flavescens*, Esp.—I have never bred this form until the present year, when I obtained about 4 per cent. from Surrey larvæ. 1b.—Pale yellow, with indistinct markings = ab. *cerago*, Fb.—Two or three per cent. represents the number of this form which occurs any year. 1c.—Pale yellow, with

dark-purplish markings=*ab. suffusa*, Tutt.—About 10 or 12 per cent. of the darker purplish-black marked forms among those bred this year. 2.—Deeper orange-yellow form=*ab. aurantia*, Tutt.—This year, for the first time, I bred about 10 per cent. of this form from Surrey larvæ."

Mr. A. Adie Dalglish (Paisley) writes:—"Of the 40 specimens I captured this year, all were of the pale yellow tone, only one having a touch of orange in the colour. 1.—Most of the specimens were of the pale yellow ground colour, with the usual red markings=*fulvago*, Linn. 2.—Three were pale yellow, with the central dot (one of these has the subterminal line represented by a row of dots)=*ab. flavescens*, Esp. 3.—Four have the ordinary red markings inclining to a greyish-purple=*ab. suffusa*, Tutt. 4.—One specimen is (as before remarked) orange-yellow with typical red markings=*ab. aurantia*, Tutt."

The Rev. E. C. Dobrée Fox (Castle Moreton) writes:—"1.—Our specimens of *X. fulvago* are of the pale lemon colour, with red bands=*fulvago*, Linn. 2.—We occasionally get the form with a central spot only=*ab. flavescens*, Esp."

Mr. Finlay (Morpeth) writes:—"1.—The majority of specimens in this neighbourhood are pale yellow with red markings=*fulvago*, Linn. 2.—The aberration *flavescens*, Esp., is also taken here. 3.—A few orange-yellow specimens also occur=*ab. aurantia*, Tutt."

Mr. Whittle writes:—"I find that I have 21 specimens of *X. fulvago* from Southend. Of these 20 are pale yellow, of which 17 are not strongly marked, and three have the dark band and markings. The *ab. flavescens* is not represented. Of the 21 specimens only one is of the orange-yellow form."

I trust our readers from other localities will give us summaries of the proportion of the various forms they capture in their own districts.—J. W. TUTT.

VARIATION OF *OPORABIA DILUTATA*.—I have often observed this species in the woods of Argyllshire and at Rannoch, but have never noticed a decidedly dark unicolorous specimen. The usual form in these places appears to be pale with many narrow transverse lines of darker grey. Around Emsworth it is also common, and here the paler lined form appears to be the usual one; darker unicolorous specimens, however, also occur.—W. M. CHRISTY, F.E.S., Watergate, Emsworth, Hants.

ON THE DISTRIBUTION OF THE SEXUAL FORMS OF *NOCTUA DAHLII*.—The following summary will give some idea of the distribution of the various sexual forms of *Noctua dahlia*. It is well known, of course, that the males of *dahlia* are usually chestnut coloured and mottled, the female, purplish or reddish and less mottled. Yet, occasionally, in some districts mottled chestnut-coloured females are to be met with, and, on the other hand, occasionally, purplish-red males. For a long time I have been under the impression that the Irish specimens, both males and females, were almost entirely purple-red, but one wants some detailed information before generalising. If our readers will look over the specimens that they have obtained in various localities, and will tabulate them under the same headings as are used in the following table, the results are sure to prove useful.

Locality and Authority.	Number of Specimens Examined.	Males.		Females.		
		Chestnut-brown (mottled).	Reddish or purplish.	Chestnut-brown.	Reddish or purplish.	Almost black.
Keswick (Mr. Beadle)	33	19	4	1	7	2
Perth (Mr. Bush)	14	4	3	2	1	4
Hampshire (Mr. Moberly)	20	12	0	1	7	0
Montrose (Dr. Gunning)	65	46	4	1	14	0
Durham (Mr. Maddison)	56	22	3	2	29	0
Morpeth (Mr. Finlay)	38	14	2	8	13	1

The following incidental notes may be interesting. Mr. Beadle writes:—"In going through my *N. dahlia* I have classified them as nearly as possible, some are almost intermediate. In the markings I find that out of the 9 dark females, 4 have the reniform filled in with pale colour, and 2 of these have a distinct irregular line of the same pale colour near the hind margin of the wing." Mr. Bush writes:—"I find that of the specimens taken here I have none distinctly chestnut, but still, two females and four males are very light and mottled. I have also 7 specimens taken at New Holland in Lincolnshire, 4 males and 3 females, which I find are all dark brown." Mr. Moberly writes:—"I have taken *N. dahlia* not infrequently at sugar in woods in Hampshire, and, so far as I can see, none of those I have taken myself vary at all from the chestnut-coloured male and purplish or reddish female. The only peculiar specimen which I have is a female, of a pale, but rather warm-coloured brown."

I should be glad of any further tabulated information on these forms, with general notes to follow.—J. W. TURR.

VARIATION OF *ASTEROSCOPUS SPHINX*.—The moths which I capture are usually grey, varying from light to dark, and occasionally, when freshly killed, looking as though dusted over with flour. It is, however, not uncommon for all the grey to be replaced by a more or less ochreous tint.—E. F. STUDD, M.A., B.C.L., F.E.S., Oxtou. *December*, 1895.

## NOTES ON COLLECTING, Etc.

WINTER NOTES.—*Hybernia defoliaria* is very plentiful just now. *H. rupicaprariva* and *H. leucophaearia* were first taken on the 18th inst.—E. F. STUDD, M.A., B.C.L., F.E.S., Oxtou. *January* 28th, 1896.

CRYMODES EXULIS VAR. ASSIMILIS IN ABERDEENSHIRE.—I caught a specimen of the Rannoch form of *Crymodes exulis*, at sugar, in a wood near this place in the beginning of August. I should be very glad if anyone can tell me if it comes to light, or which is the best way to capture the species.—A. E. CANNON, Mannofield, Aberdeen. *January*, 1896.

AGROTIS LUCERNEA NOT AN INSECT THAT COMES TO SUGAR.—I notice that *Agrotis lucerneae* is mentioned as not coming much to sugar in the neighbourhood of Aberdeen. The species has the same habits here. Though it is usually common, and I have taken many at flowers, I have taken none at sugar, with one or two doubtful exceptions, where



the flowers had been sugared.—N. M. RICHARDSON, B.A., F.E.S., Monte Video, nr. Weymouth. *January, 1896.*

DISTRIBUTION OF *ACIDALIA HUMILIATA* IN BRITAIN.—With reference to the habitat of *Acidalia humiliata*, Mr. Tutt writes, in his notes, *re A. dilutaria* and its allies (*Ent. Record*, p. 126, No. 6, vol. vii.): “. . . . at Freshwater, where alone, at present, the species has been found in England.” In supposing the insects taken during the last few years to be the only English ones, he is mistaken, as I have in my cabinet, three, which I received in exchange in the seventies. About two years ago I forwarded them to Mr. Hodges, who says there is no doubt as to their being *A. humiliata*. They are larger than two he sent me, having a wing expanse of 10”, whilst the latter measure only 8·5”. Unfortunately I have not the label for the insects, and cannot find an entry of them in my diary, owing probably to the pressure of professional engagements at the time; but we used to consider *A. interjectaria*, as it was then called, by no means uncommon, and included under that name specimens both with and without the brick-red costa. I am sure my insects did not come from Freshwater, as I used to collect there at that time, and could not fail to have remembered the particulars of any from a locality I knew so well, and I am equally certain they were received in exchange as English from some reliable correspondent. I have no doubt many other specimens will be found, sooner or later, in the collections of the sixties and seventies; whilst some may have been scattered, and remain as yet unrecognised in comparatively recent ones.—W. S. RIDING, M.D., F.E.S., Buckerell. *December 24th, 1895.*

EARLY APPEARANCE OF *PHYGALIA PEDARIA*.—I was at my favourite hunting ground yesterday, and found several *Phygalia pedaria*, evidently just freshly emerged, at the base of oak trees. Is this not very early? On looking through the *Record*, I could find no notice of the species occurring before January 31st.—L. S. BRADY, 17, Filleigh Street, Sheffield. *January 13th, 1896.*

EMERGENCE OF *PLUSIA GAMMA* IN DECEMBER.—I was very much surprised last Sunday, on looking into my breeding-cages, to find that a specimen of *Plusia gamma* had emerged. This seems to me very extraordinary, as the cage was kept in an exceptionally cold room.—A. ADIE DALGLISH, Glasgow. *December 11th, 1895.* [What else was the *P. gamma* to do, since it is not known to hibernate as a pupa, or, in fact, to hibernate at all in Britain? Does this species not, like *Colias edusa*, attempt to be consecutively brooded all the year, as it is in its sub-tropical haunts, and thus become annually exterminated here?—Ed.]

ASTEROSCOPIUS SPHINX.—Referring to my note (*ante*, p. 157), I may add that the total number of males taken between November 6th and November 28th, in two illuminated traps, set within a few hundred yards of each other in the same wood, was 207, besides the bi-sexual one there referred to. I obtained no females this year. Last year I took about the same number of males and two females. I beat several larvæ this year from apple and oak, principally the former, the leaves of which they seem to prefer to any other food, except other larvæ (of their own species or any other), which they will eat directly. They all thrive until full-fed, and then died off, very few pupating, and of these none emerged, but all died.—E. F. STUDD, M.A., B.C.L., F.E.S., Oxtou. *December, 1895.*

## NOTES ON LIFE-HISTORIES, LARVÆ, &c.

**HABITS OF LEPIDOPTEROUS LARVÆ.**—Is it not a fact that almost all larvæ wander in nature when about to pupate, *e.g.*, we have all observed the *Sphinxidae* racing round the breeding-cage, and many other species have the same habit. The object seems to be to give time for the extrusion of such food-contents as may be in the intestine, and for the silk-spinning organs to become perfected. Of course, some species which do not fall from the boughs, but get to the ground down the stems, do not require the extra excursion others take, and *Cerura* would appear to be, as a rule, a stay-at-home on the tree.—S. WEBB, Dover. December 9th, 1895.

**HABITS OF THE LARVA OF COCCYX COSMOPHORANA.**—At a recent meeting of the South London Entomological Society, a discussion on the habits and distribution of *Coccyx cosmophorana* took place. In the course of the discussion Mr. McArthur, well known as a shrewd observer and indefatigable collector, stated that he had taken the species very rarely in Rannoch, but had bred a long series from larvæ obtained at Forres. He stated that the larva was apparently symbiotic with *Retinia resinana*, feeding in the galleries which the latter larva bores in the resinous excretory masses which form around it during the time that it is feeding. These galleries in the resinous nodules are lined with silk, and the frass of the larva is entangled therein. Mr. McArthur asserted that the larva of *Coccyx cosmophorana* fed upon "the frass of *Retinia resinana*," and that from a bag full of nodules, collected at Forres and containing larvæ thus feeding, he bred a long series of *C. cosmophorana* a short time ago, during the time that he was staying in the Shetland Isles. This strange habit of the larva invited further observation and more detailed description, so I appealed to Mr. J. Hartley Durrant. He very kindly sent me, in the original German, the account of its life-history and habits, as given by Ratzeburg (1840), Kaltenbach in 1874, and Hartmann in 1879. There can be no doubt that Mr. McArthur's observation is somewhat at fault, and that the supposed habit, from which it would appear that *C. cosmophorana* is an inquiline of the excrescence of *Retinia resinana*, is probably erroneous. The fact is that *C. cosmophorana* itself makes an excrescence similar to, but smaller than that of *R. resinana*, and that what Mr. McArthur considered were the excrescences of the latter, were simply the natural domiciles of the former. Kaltenbach knew the species from the egg, and describes the female as "laying her eggs in the tiny fissures in the bark of *Pinus silvestris* and *P. picea*. The young larva then bores through the tender bark into the young shoots, when resin oozes out, and is built up into resin galls. These increase in size with the growth of the larva, nevertheless they are always smaller than those made by the larva of *Tortrix resinana*" (*Pflanzen-Flinde Ins.*, 697). Hartmann adds that the larva lives from "September to April," gives *Pinus abies* as a food-plant, and states that it lives in "resinous excretions, which are smaller than those of *R. resinana*" (*Mitth. Münch. Ent. Ver.*, iii., 189). I would here acknowledge Mr. Durrant's kindness and courtesy. As I was at this time writing to Mr. A. Horne, of Aberdeen, I pointed out to him the improbability of *C. cosmophorana* larvæ feeding in the manner described by Mr. McArthur, and told him at the same time of Kaltenbach's observa-

tions. Mr. Horne replied:—"I am perfectly sure that *C. cosmophorana* does feed in *resinana* nodules; I find the old pupa-case of the latter in the nodules along with the fresh pupa of *C. cosmophorana*. I am inclined to doubt the statement that the larva of the latter makes a nodule similar to that made by *resinana*, but smaller. I am about the fir woods almost continually, and feel sure that if such were the case they would be observed. I have captured *C. cosmophorana* at Lhanbryde and Countess Wells, where *resinana* does not occur." This latter statement appears to be conclusive (in spite of the previous corroboration of Mr. McArthur's views), that *C. cosmophorana* does exist in some localities where it cannot dwell in *resinana* nodules, and hence makes its reputed mode of life in those districts where *R. resinana* does occur still more remarkable. Here, then, is something for the Scotch collectors to clear up.—J. W. TUTT, Westcombe Hill, S.E.

### CURRENT NOTES.

We have to inform our subscribers that at the expiration of 1896, we shall revert to our old plan of publishing monthly. A small section of our subscribers object to pay the proportionate cost necessary to produce 18 numbers instead of 12 numbers annually. During 1895 we published no less than 460 pages of ordinary letterpress and 28 pages of index=488 pages altogether. We propose doing the same during the current year, but even that is insufficient to carry off all the material we get. We have no objection to the preparation of all this material for press, but we do object, after we have done it, to the implied suggestion of one of our subscribers that he is being cheated. After Dec., 1896, therefore (*i.e.*, when a new volume begins at the commencement of a new year), we shall publish but 12 annual numbers, as was formerly the case. These might be of double the usual size (*i.e.*, 48 pages instead of 24) if subscribers were quite unanimous on the matter, but how far is unanimity possible?

At the sale of the remainder of Mr. W. H. Tugwell's collection, the following prices are perhaps worthy of notice:—*Uleora viduaria* 21/- (for two) and 37/6 (for three); *Boletobia fuliginaria* 45/- (for two), 48/- (for three), 47/6 (for two) and 47/6 (for two); *Acidalia straminata* var. *circellata*, 42/-; 47/6 (for two lots of five with specimens of other species); whilst four lots of *Cidaria reticulata* (three specimens) produced 21/-, 32/6, 28/- and 32/6 respectively. The *Eupitheciae* also fetched good prices. A specimen of *Margarodes unionalis*, taken at Kingsdown in July, 1877, went for 55/-, another from the same locality and captured the same year, for 30/-, whilst a specimen of *Mecyna polygonalis*, taken at Deal, July 10th, 1877, and another taken at Kingsdown, July 14th, 1877, went for 95/- and 63/- respectively. On the same day the collection of Coleoptera made by Mr. G. A. Lewcock was practically given away, a result evidently due to the fact that it was not advertised, and that none of our Coleopterists knew of the sale till it was over.

The finest collection of Irish Lepidoptera that has yet been made—that of Mr. Percy Russ—is to be sold at Stevens' sale-rooms on February 17th; whilst some very fine *Chrysophanus dispar*, the *Catocala electa*, captured by Mr. Vine, and other rarities, will be disposed of on March 9th and 10th.

Mr. Austen, of 5, North Street, Folkestone, has undertaken to collect MACRO-LEPIDOPTERA by subscription, from the commencement of March until the end of September. The whole of the insects captured are to be divided among the 12 subscribers, of whom 8 have already been obtained. The district worked will be the rich one of South-east Kent—Folkestone, Dover, Deal, Ashford and Canterbury, with which Mr. Austen has been familiar from his boyhood. Mr. T. Salvage, of Arlington, Sussex, will collect this year in Rannoch and the Shetland Isles. If last year's success in the North is to be repeated this, collectors there will have little cause for complaint.

Mr. J. Anderson, Alve Villa, Chichester, states that his friend Mr. Davey, from whom he obtained the cases of the Basket Caterpillar, described in our article, *ante.*, pp. 121–123, has offered to get another supply of cases for any entomologists wishing to verify the life-history of this curious insect.

## SOCIETIES.

THE CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY met on January 21st, 1896.—Exhibits:—Rev. C. R. N. Burrows: a long and variable series of *Calamia lutosa* taken at Rainham during the past year, and photographic enlargements of some of the specimens showing special characters, to which he referred in a paper which he read on the species. Messrs. Bate, Heasler, Prout and Tutt, also exhibited *C. lutosa* from various localities.

Mr. Tutt exhibited on behalf of Miss Elizabeth Miller, Spring Villa, Coval Road, Chelmsford, a cluster of cocoons of *Aphomia sociella*, and read the following notes from her:—ON A CLUSTER OF COCOONS OF APHOMIA SOCIELLA.—“In October, 1894, a man working for us, whilst removing a quantity of wood from a corner of the garden, found what he thought was the nest of a mouse. He tried to open it, and, partly succeeding, discovered that it contained a number of caterpillars about half an inch long, and of a bright yellow colour. He gave it to my father, and we put it in a box in an outhouse, without damping it the whole of the time it was in our possession. We kept it until May, 1895, when a large number of moths emerged from it, of which we only kept nine. The moth turned out to be *Aphomia sociella*. When found the cluster was covered with the heads, thoraces, and wings of Humble-bees. It was placed under the wood, which was on a grassy part of the garden, in a little excavation in the ground, apparently lined with dead grass mixed with leaves and some woolly substance. It was our first idea that it was a bee's nest, and we are quite sure that it was some kind of nest before the moth took possession of it. We see that in the *Entom. Record*, vol. vi., pp. 76-77, Mr. W. P. Blackburne-Maze describes and gives a plate of a similar nest, but throws some little doubt as to the larvæ feeding in the nests of Humble-bees, and suggests that, in the instance he records at least, the larvæ probably fed in a wasp's nest. However that may be, there can be no doubt that the cluster we record was formed in the orthodox fashion, in a Humble-bee's nest, as it was placed in an exactly similar position to that in which Humble-bees generally build, and also, whereas there was not even the remains of one wasp to be seen, there was an abundance of the remains of Humble-bees.” Mr. Tutt also exhibited

on behalf of Mr. W. E. Butler, of Reading, two specimens of *Argynnis lathonia*, sent to him by Mr. B. Stafford Chope as British, and read the following notes received from him:—"As *A. lathonia* is one of those species, British specimens of which have a high money value, it appears advisable that a record of all captures of such should be made. The first specimen was sent from Axminster, Devon, on April 3rd, 1894, with the following note:—"I have sent you an *A. lathonia* as a speciality; I only took five last season (they came from Roseberry Woods, near Exeter), and I hope you will admire it.' On Dec. 3rd., 1895, Mr. Chope, writing from 117, Queen's Gate, S.W., offered me another specimen, stating:—"I have to spare a very fair specimen of *latona*, one of THREE I took this year in Hants.' This was forwarded on December 10th, with a letter in which the following reference to the insect occurs:—"Re *latona*. General statements such as the one you refer to in Mr. Barrett's new work are usually far from being correct. In that case, I may mention that I myself have taken SEVEN *A. latona* in the last four years, and I know another collector (who visits the same locality as myself), who took eight this year alone.' Of course I wish in no way to prejudice Mr. Chope's captures, but think that I should point out that the capture of five specimens at 'Roseberry Woods' and the capture of three specimens 'in Hants,' make a total of eight, and not seven specimens, as Mr. Chope concludes. Both specimens are loose on their pins."\*

Mr. May read the following notes:—"ON THE VARIATION IN THE COLOUR OF THE COCOONS OF *SATURNIA PAVONIA*.—"I have written the following notes on the breeding of *Saturnia pavonia* as I think that they may possibly be of interest, especially so far as they refer to the coloration of the cocoons.

"During the winter of 1894, both Mr. Bell and myself received a dozen pupæ of this species from a correspondent in Yorkshire; these were, without exception, in dark cocoons, and judging by the moths which I bred I should say that the larvæ had been starved. However, Mr. Bell managed to obtain ova from a pair of his, some of which he gave me. Knowing what poor specimens the parents were, I made up my mind to be particular about the feeding of the larvæ, so as to breed larger specimens next year if possible.

"They were fed on whitethorn, and I can safely say that throughout their existence, they were never without a supply of fresh food. The cage in which they were kept was made of zinc with a glass dome, being light, well ventilated, and having a layer of dry moss and sand at the bottom. Nineteen spun up, some on the glass or zinc, but mostly on, and in some cases under the moss. Of these nineteen, eighteen were more or less pale coloured and only one dark. To return to the rest of the brood (those in Mr. Bell's keeping), he tells me that he kept his larvæ under a glass shade without ventilation, with the result that they were always in a damp atmosphere, often very much so, he also owns to starving them a good deal. These were also fed on white-

---

\*In publishing the above we do so entirely without prejudice to the *bona fides* of Mr. Chope's captures, but we agree with Mr. Butler that every capture of this species in Britain should be recorded. We have asked Mr. Chope (in our position as Editor), for information, but Mr. Chope has not answered our letter, and we would again appeal to him for the name and address of the friend who captured eight specimens in Hants this season.—ED.

thorn. The result was 16 cocoons, every one of them dark. Wishing to see whether the species would bear forcing, on November 24th I put three of my pale cocoons on damp sand in the forcing cage, which is kept in the kitchen, and on looking into it about three days later I was surprised to find that they had all turned dark brown. However, wishing to make quite sure, on January 1st I put three more with them, and on taking them out two hours later I found that the change had already taken place.

"I think that it would be as well here to summarise the histories of the two broods:—Brood No. 1 (Mr. Bell's): Larvæ kept in a practically air-tight cage with damp atmosphere. Badly fed. Result—16 cocoons all dark. Brood No. 2 (my own): Larvæ well-fed and kept in a dry cage with plenty of light and air. Result—19 pale cocoons, one only being dark. On six of the pale ones coming into contact with damp they turned dark almost immediately."

"With regard to the one dark cocoon, it seems to me that it is quite possible that in changing the food-plant I might have splashed it on pulling the old stalks out of the water-bottle, which would account for its colour. From the remarks of other lepidopterists that I have heard and read on the subject, I gather that the general idea is that the colouring matter is obtained from the alimentary canal, and is evacuated from the intestine and mouth by the larva on the interior of the cocoon, and also that the colour is not regulated by its environment. Can it be that this substance is merely a sort of "cement" to strengthen the cocoon and make it waterproof; depending on the dampness of the matter and the atmosphere for its colour? From this it would seem that my larvæ, through hereditary weakness, were unable to produce this "cement," and being kept in a dry situation the cocoons remained pale. I think that it is the more likely, from the fact that the cocoons are somewhat thin in texture, and are not so hard as those that I have had before."

"I refrain from discussing the subject further, having had so little experience with the insect, but I should very much like to hear what others have to say on the matter."

Mr. Newbery stated that he had found the following plan very successful for relaxing Coleoptera:—First soak the specimen for twenty-four hours, or more, in water; then drain off superfluous moisture, and apply wood-naphtha with a brush till the specimen is sufficiently pliable to set.

C. NICHOLSON, }  
L. J. TREMAYNE, } *Hon. Secs.*

The NORTH LONDON NATURAL HISTORY SOCIETY held a meeting on January 28rd, Mr. Jennings exhibited the following Coleoptera: *Lucanus cervus* and *Rhizostrogos solstitialis*, taken at Streatham, July, 1895; a pair of *Necrophorus humator*, taken from beneath a dead ferret in Epping Forest, 5th May, 1895; *Necrophorus vestigator*, a pretty, as well as a local, insect, knocked down whilst flying in a field bordering Larkwood, 11th May, 1895; *Ocyypus olens*, taken from under a log at Waltham, October, 1894; *Cetonia aurata*, taken from blossoms of a large shrub, Box Hill, 12th May, 1895; a pair of *Melolontha vulgaris*, knocked down whilst flying round a gas-lamp in Tanner's End, Edmonton, May 14th, 1895. The female was clinging to the burner, within half an inch of the flame, and had to be

dislodged with a stick; *Cryptocephalus hypchoeridis*, one of several taken from flowers of *Hieracium*, Box Hill, 26th May, 1895; *Timarcha coriaria*, from Box Hill, 16th April, 1895. Mr. Jennings remarked that the mild weather of last week had induced three species of Diptera to emerge from hybernation, viz.: *Musca domestica*, *Calliphora erythrocephala* and *Pollenia rudis*. A letter received yesterday from a friend at Colchester announced that small Diptera were on the wing there on Sunday the 19th, and that one *Vanessa urticae* had been seen. Mr. R. W. Robbins recorded the recent emergence of a specimen of *Spilosoma urticae*. Mr. Quail gave an admirable summary of the entomology of 1895. Roughly speaking, the season had been good in the N. and N.W., but below the average in the E. and S. The unusual captures included two or three *Chorocampa celerio*, imagines of *Sphinx convolvuli* from various parts, and several larvæ from Cornwall, *Catocala fraxini* from Hastings, Folkestone and Farnboro', several *Plusia moneta*, and a specimen of *Ennomos autumnaria* from Hythe. Mr. Quail also summarised the entomological literature of 1895, and referred to the deaths of Profs. Huxley and Riley, Mr. W. H. Tugwell and Major J. N. Still. Mr. Quail exhibited a cabinet drawer containing examples of British Rhopalocera, arranged according to Dr. Chapman's scheme, put forward in his paper on the "Phylogenesis of the Rhopalocera." Mr. Wattson summarised the occurrences of the Odonata in 1895. In his experience they had been unusually scarce, and he thought this might be due to the unusual abundance of the COLEOPTERA. Dragonflies would have a fair chance if hatched at the same time as beetles, but if the latter had a start they would probably take the lead throughout. Mr. Lucas, of Kingston-on-Thames, had captured a specimen of *Eschma juncea* paired with *Æ. cyanea*, and the same entomologist had also recorded the capture of *Enallagma cyathigerum* by Sundew (*Drosera rotundifolia*), whilst carrying a specimen of the latter in his hand. The greatest event of the year was Mr. Nunney's paper in the October number of *Science Gossip*.

## REVIEWS AND NOTICES OF BOOKS.

THE TRANSACTIONS OF THE CITY OF LONDON ENTOMOLOGICAL SOCIETY FOR 1895 contain an original article, "On the modern principles on which the classification of the Lepidoptera is based," by J. W. Tutt, in which the larval, pupal and imaginal characters used by Dyar, Chapman, Comstock, &c., are explained. The subject of neuration is rather fully dealt with, and the evolution of the neuration of the *Pieridae* from that of the *Papilionidae* is illustrated by diagrams of the neuration of *Papilio*, *Aporia*, *Pieris*, *Euchloë* and *Leucophasia*, the development of the highly specialised neuration of *Leucophasia* being traced by successive steps from the more generalised neuration of *Papilio*. Copies can be obtained from Mr. C. Nicholson, 202, Evering Road, London, N.E.

ERRATA.—p. 146, line 17—for "*auricoma*" read "*euphorbiae*," and for "*Pharetra*" read "*Arctomyzicis*"; p. 146, lines 40-42—delete "though the moth . . . . congeneric," and substitute "The name *Bisulcia* falls before *Craniophora*, Snellen (1872), with the same type."—A.R.G.

# The Entomologist's Record

## AND

### JOURNAL OF VARIATION.

---

VOL. VII. No. 10.

MARCH 1ST, 1896.

---

#### SALLOWING.

By J. W. TUTT, F.E.S.

The iron grip of winter has not really laid its hold upon the land this year, and hence the early moths, which have sometimes to wait awhile for a favourable spell of mild weather to woo their emergence, have, during the last few weeks, presented themselves with unusual earliness. Even in early January, *Phigalia pedaria*, *Hybernia ruficaparia*, *H. leucophaea* and their relatives were on the wing, whilst before the first month of the new year was gone, hibernated wasps and Tortoise-shell butterflies had re-awakened from their winter sleep or were preparing for the duties of maternity.

The tender verdure of spring is now beginning to clothe the earth with its charming enamel; the flowing sap is streaming into the boughs, bringing renewed life and vigour; the earliest migrants are twittering in the woods; the pear trees are clothing themselves in virginal white; the first whiff of the cherry blossom scents the soft west wind, whilst the clusters of luscious willow bloom make huge nosegays in the yet almost leafless woods.

Sallows are to the entomologist what buttercups and daisies are to children. They re-awaken hopes that have hibernated during the winter months. By no one else are the same associations conjured up. "Sallowing" is not comprehended by the multitude, but to the entomologist the word breathes of newly-awakened vigour, of a fresh interest in outdoor life. During the winter the collecting impedimenta have been overhauled, replenished and refurbished. Nets, boxes, lanterns, etc., have been put in order, and the first still warm evening sees the entomologist on his rounds.

When is the time for allowing? you ask. There is no exact date. The same forces of nature that bring out the willow bloom re-awaken into vigour the autumnal moths after their hibernation, and tempt from the pupa the early spring species which appear with the first fine days of March or April. When, therefore, the willows are in blossom, the time for visiting them has arrived. The impedimenta necessary for collecting insects at them are few—glass-bottomed boxes, a lantern and "Sairey," the latter as large and comprehensive as possible. Choose some sheltered wood or shaw, where the willow bushes are not too numerous. Mark their position carefully, for by twilight or after dark they may easily be missed, especially in a strange and not well-known spot.



My early experiences of "sallowing" dates back to the early "seventies," when four of us followed the good advice of certain authorities, and spread a huge coarse sheet on the ground beneath the willow bushes, and sometimes shook the moths thereupon—and sometimes didn't, for occasionally there were none to shake. Now and then the willow bush was awkward, it grew where the sheet could not be placed beneath it. It might be that a ditch was in the way, or a quick-set hedge or a hawthorn bush would flourish beneath the willow tree. Then the use of the sheet was unsatisfactory; however, we obtained many moths, many others, of course, escaped.

My later experiences have been gained under the intelligent guidance of Dr. Chapman. In these later excursions I have figured rather as an ornament than an useful member of the party of two visiting the lovely woods at Dinmore. Once the Doctor allowed me to shake the willow-bushes. Once the Doctor allowed me to box the insects in the umbrella. Only once though, in each case. The experiment has never been repeated.

The Dinmore woods lie on the slopes of a hill overlooking the broad valley of the Lug. The Doctor knows the position of the willow-bushes. He goes direct to each one on the darkest night without the slightest hesitation. He puts the handle of "Sairey" into a bush, hooks the more important branches, suddenly and dexterously twists the handle, and before you have time to breathe down comes the umbrella full of catkins and moths. Agrotids are there in the shape of *Pachnobia leucographa* and *P. rubricosa*; Orthosiids in crowds—*Taeniocampa populeti*, *T. instabilis*, *T. munda*, *T. gothica*, *T. stabilis*, *T. mimosa*, *T. pulverulenta* (and perhaps *T. gracilis*), *Panolis piniperda*, *Hoplorina croceago*, *Orrhodia vaccinii* and *O. ligula*; Xyliniids in smaller numbers—*Xylina socia*, *X. semibrunnea* and *X. ornitopus*, whilst *Gonoptera libatrix*, *Hyppena rostralis*, and sundry *Depressariae* put in an appearance; *Eupithecia abbreviata*, *Lobophora lobulata* and *Tephrosia crepuscularia* stand wonderingly, whilst, among the swarms, we have hitherto looked in vain for *Orrhodia erythrocephala* and *Dasyampa rubiginosa*; but the Doctor softly hums something about "Hope springing eternal" whilst I mutter something about "Hope deferred."

Whilst this humming and muttering are going on the moths are being inspected with the rapidity of lightning, the choicest specimens are boxed, Sairey is turned upside down, and quick as thought a fresh position is taken up, the hitherto unshaken branches are hooked, another sudden twist, and the umbrella is full of catkins and moths, much as before.

As to the proportionate numbers of the species that fill the umbrella, *T. pulverulenta* is usually easily first, but the specimens show little variation; *T. gothica* and *T. instabilis* come next in abundance, and both are exceedingly variable; *T. stabilis* swarming, but only presenting minor aberrational forms, whilst to *T. munda* the same remarks apply, although occasionally a few striking aberrations occur. Sometimes there is a *T. mimosa* year; then this beautiful and delicate moth abounds, and rivals in numbers its more normally abundant companions. At other times there is a *P. leucographa* year, when this local species is common. The Wye Valley seems to be one of the chosen districts of this insect—Breccon

and Hereford producing sometimes large numbers. *P. rubricosa* is also common, and oh, so red! whilst *T. gracilis* is scarce, appearing usually later, and when the other species are almost over. The gem of the umbrella's contents, however, is the black form of *T. populeti*, whilst the bright-tinted *P. piniperda*, its beauties unrecognised until one sees it alive, is sometimes accompanied by its grey-green aberration, which, considered on the score of its rarity, is a much greater prize.

Then there are the hybernators to be looked over. *Hoporina croceago* must be taken home, placed in a large glass jar, supplied with a few twigs and dead leaves of the oak, fed with moistened sugar, and then you will obtain a good supply of eggs. *Xylina semibrunnea*, too, must on no account be killed if a hen, nor *Dasyampa rubiginea*, for both should be given every opportunity to lay their eggs, so that a supply of moths may be obtained by the fortunate captor. A few female *Pachnobia leucographa*, too, should be imprisoned. These must be provided with a supply of leaves and old flower-stalks of plantain, but otherwise may be treated as *H. croceago*.

Pages more might be written. We might tell you to get to the woods early and kick the aspens to bring down the paired imagines of *Breplos notha*; we might suggest that you should search with your lantern for the hundreds of Noctuid larvæ that feed by the sides of the woodland paths at dusk, or take advantage of the afternoon sun to catch *Dasytoma salicella* as it flies by the hawthorn bushes, and we might even hint with bated breath that now is the time to hunt for *Xylomyges conspicillaris*, and that it occurs in this locality. But these are nothing to do with "sallowing," and are such trivial matters that they are scarcely worthy even of passing notice.

## The Resting Habit of Insects as exhibited in the Phenomena of Hybernation and Aestivation.

By W. S. RIDING, M.D., F.E.S.

It seems unfortunate that the word "hybernation" has been used with reference to all the stages of an insect's metamorphosis whilst the meaning is much limited when applied to ovum and pupa. Applied to larva and imago, hybernation denotes a change from activity to torpidity for a continuous period, assumed in a suitable situation at the approach of winter, and followed by a return to activity, its object being the preservation of the species; but, applied to ovum and pupa, owing to their nature, it can only denote a reaction to the stimulus of cold. In the latter case, it is "a state," in the former, "a selection of a state for a certain purpose." Kirby and Spence drew this distinction between torpidity and hybernation many years ago, though they did not apply it as above. If this be admitted, it will conflict with the argument of Mr. Tutt, that, "as in temperate regions, with few exceptions, all insects hybernate at some stage or other . . . it is clear that the tissues of insects are capable at any stage of developing the habit of rest into a prolonged rest." In another place, Mr. Tutt seems to wish us to accept this as a postulate, "it would appear that all living matter possesses a capacity of assuming a resting state." In a general sense this may be perfectly true, as all living matter seems to require periods of

rest at short intervals for recuperation, which we call sleep; but Mr. Tutt appears to be alluding to a resting-state analogous to hibernation, which is not a physiological necessity. If we are to look for some predisposing cause, some "capacity for assuming a resting state," may we not find it in the quiescence of the larva after each moult? The prolonged inactivity of the pupa after the final moult is necessitated so as to allow important changes to take place as to mouth, muscles, wings, assimilative, nervous and reproductive systems. In a minor degree a similar inactivity exists for a longer or shorter space of time after each moult, during which the new external tissues get hardened. May not this help to explain the occurrence of hibernation at some definitive moult only, varying in different species, as described by Mr. Tutt and others?

For my own part, whilst agreeing with Mr. Kane in considering hibernation, "a suitable adaptation," and that its "unreasonable survival" explains many of Mr. Tutt's anomalous instances, I cannot attribute it in all cases to cold alone; but, when induced in the larva, think it due, as Mr. Tutt does, to insufficiency or absence of food as a primary cause, and cold as a secondary one, whilst admitting the all-efficiency of cold in the hibernation of the imago.

Mr. Kane seems to imply, if I do not misunderstand him, that hibernation may be only torpidity; but, surely, it is something more. We all agree that torpidity may be a result of cold, but how can this explain a larva providing a shelter for itself before cold has set in—the old argument against it? Though many larvæ simply hide themselves in any suitable hole, under stones, leaves, moss, etc., others line their cavities with silk, and never emerge till their food is ready for them to commence feeding again. Larvæ are imperfect insects, and their hibernation does not run on a line with that of the imago. They have no reproductive system (or only rudimentary elements), and their life's object is nutrition to such an amount as is necessary for the subsequent formation of the perfect insect. Their capacity for nourishment is many times that of the imago. If this be the case, is it not probable that the absence of food will react sooner than any other cause? Most vegetation dies off at the approach of winter, and may not a scarcity of food induce sensations in the larva, warning it to provide winter quarters? Larvæ can stand a great amount of cold; they can be frozen and yet retain their vitality, and we are repeatedly seeing them surviving the severest winter, but starvation plus cold (the larva not having hibernated) is fatal. Do we not meet with this throughout all nature? Birds die during severe winters, mostly not of cold, but of starvation plus cold; and so it is with ourselves, we can resist extreme cold provided there is a sufficient food supply. Is it not probable, then, that scarcity of food warns the larva to seek winter quarters, and increasing cold gradually induces torpidity, a torpidity, let us remember, not variable so as to allow of activity during milder winters, but persistent in true hibernation till the warm spring sets in and food-plants are ready to supply nourishment? Kirby and Spence, in support of this, quote Reaumur's instance of the larvæ of *Melitæa cinxia* and *Porthesia chrysorrhoea*, the former coming out of winter quarters a month earlier than the latter, because they are grass or plantain, and the others, arboreal, feeders. The same occurs

with the larvæ of *Aplecta advena* and *A. tineta*; the former, feeding on low plants, reappear in March, the latter feeding on birch, in April. The larvæ of *Girrhoedia xerampelina* do not appear till May, when the ash is budding.\* The larvæ of *Boarmia repandata* and *Boarmia rhomboidaria* feeding on blackthorn, bramble, plum, etc., are out early on their food-plants; whilst those of *Boarmia roboraria*† wait till the oaks are in leaf in May. These are a few instances occurring to me.

Our ancestral larva, then, under severe climatic conditions, with a short summer and long winter, would only have two courses open to it when, not fully fed, it found its food-plant dying off and cold approaching. It must either wander about in search of food, and, failing it, incur death from starvation plus cold, or else it must meet the situation by suitable adaptation, *i.e.*, by hibernating. Does not the partial wintering of so many of our late larvæ help to corroborate this view? This state, during which the larvæ nibble more or less on fine days throughout the winter, seems not true hibernation, but rather torpidity, and helps to illustrate the difference between the two conditions. The larvæ so acting, can of course only be such as are able to find a food supply throughout the winter, *i.e.*, those that feed on grasses, plantain, roots, mosses, lichen, etc. They are exposed to cold which they are able to resist as they can find food, and keep themselves alive without true hibernation. Then, again, does not our ability to force some hibernating larvæ to pupate without hibernation (so much carried on of late years) by means of constant food supply plus high temperatures, point in the same direction? Second broods in the south, and even third partial broods in unusually hot seasons, such as I recorded in 1893 (*Ent. Record*, vol. iv., p. 344), are other illustrations. Food and heat are the great obstacles to hibernation—true it is, all larvæ do not yield to these stimuli; but, then, is it not because their “ancestral memories” are too strong?

The anomalous instances brought forward by Mr. Tutt, of insects hibernating alike through the hottest and coldest weather, are explicable on Mr. Kane's theory that they are unreasonable survivals. In some the hereditary tendency may be too strong, though the environment may be altered and unsuitable the insects have not yet adapted themselves to it, and still yield to the “memories” of former times.

The hibernation of the imago varies from that of the larva because of the different part it has to play, and in its case cold certainly seems the primary agent. The perfect insect, as a rule, has a short existence; its life object being the propagation of the species, and after accomplishing its work as a reproductive agent, it dies. The differences connected with its hibernation seem adapted to meet this purpose. Most have emerged during the late autumn, and what they have got to do is to keep alive long enough to pair and deposit eggs in such a manner and at such a time as is most likely to ensure their future development. This an insect may bring about in two ways, either by covering them with suitable material, such as hairs, cement, etc., as is done by some which lay eggs earlier in the season, which

\* March, on flower-buds.—Ed.

† Feed in March and April on the rind of small twigs, and on buds till leaves appear.—Ed.

pass the winter in the egg state, i.e., *Trichiura crataegi*, *Leucoma salicis*,\* *Clisiocampa neustria*, etc.; or else by deferring oviposition till the spring, the plan adopted for the most part by the late autumnal moths. These probably pair, according to circumstances, early or late; in the former case the male dying without hibernating, in the latter both sexes hibernating. Here cold seems the agency producing hibernation, though there is a connection with food supply, as by its abundance the success of the hibernation is rendered more probable. Those insects which supply themselves freely with food, sucking the nectar of the ivy and other sweets (often greedily appropriated) will stand the best chance of survival, though it is cold that induces the insect to seek shelter to preserve its vitality whilst its life purpose is as yet unfulfilled, and to remain in that condition till the time arrives when it can be accomplished.

---

\* Passes winter in larval state in Kent.—Ed.

---

### The Relationship of *Endromis versicolor* to the Sphingides.

By A. BACOT.

(Concluded from p. 280).

I see from Mr. Tutt's paper, "An attempt to correlate the results arrived at in recent papers on the classification of Lepidoptera." (*Trans. Ento. Soc. Lond.*, 1895, part iii.), that *E. versicolor* is not quite so orthodox in its manner of emergence as a respectable *OBTECOTA* should be. Mr. Buckler, in his description of the pupa, remarks as follows: "About a week or ten days before the time of emergence, the cocoon is pushed by the enclosed pupa from a prone to a vertical position, the upper end is ruptured, and the pupa protrudes its head through the opening, and continues by degrees to advance until it is exposed as far as the ends of the wing cases; fixed in this position, it remains quiet a longer or shorter time, till the insect is able to escape, though in two or three instances the pupa has worked itself out entirely free from the cocoon before the moth could be disclosed." You will find that the dorsal area of the last few segments is thickly studded with spines, which are no doubt used by the pupa in forcing its way out of the cocoon. *C. elpenor* also has a ridge of spines on the free and next following segments. These are, I believe, used by the pupæ for a similar purpose to those of the above-mentioned species. I had several larvæ of *C. elpenor* last year; they pupated in a flower-pot filled with moss, and formed long and rather narrow cocoons by spinning the moss stems together with a small amount of silk. These cocoons were all vertical, or nearly so, and were from half-an-inch to an inch longer than the pupæ, the top being usually left open. In the spring I noticed that the pupæ used to move up and down in their cocoons. One in particular used to push itself half way out on sunny days, going down again in cold and dull weather, and it was half way out of its cocoon when the moth emerged. This was, however, an isolated case, some moths emerging from pupæ that had their heads only protruding, while in other instances no movement on the part of the pupa had apparently been made before emergence.

The above noted resemblance between the pupal habits of

*E. versicolor* and *C. elpenor*, though not perhaps in itself sufficient to establish the relationship, seems to greatly strengthen the case when taken in conjunction with the similarities I have already mentioned in the larval state. It would be interesting to know if similar habits or pupal spines occur in other species of the *Sphingidae*.

Even in the imagines, I fancy I can detect a certain amount of resemblance. In shape, the wings of *E. versicolor* differ chiefly from those of *Smerinthus* in having a more regular outline and greater breadth, but when we consider the width of the wings in *S. populi*, compared with those of *S. tiliae*, and the regularity of outline in those of their near ally, *S. ligustri*, we see that these differences are not of great importance. Again, the scheme of coloration is not unlike, from a general point of view, though I must admit that there is considerable difference in detail. There is also the discoidal lunule on the forewings, which we find white in *S. ocellatus* and *S. populi*, and black in *S. ligustri*. A careful examination of the ocellated spots on the forewings of *S. carpini* also shows this lunule faintly visible, and it can be traced in *L. quercifolia*; but as we find a white spot in just about the same position in *Bombyx quercus* and *Odonestis potatoria*, and a well-marked dark lunule in many species of *Liparis*, not to mention its occurrence in *Notodonta* and some Noctuids, it is probably too general a character to be of much value in tracing a connection between *E. versicolor* and the SPHINGIDES. On the whole, I do not trust much to these rather far-fetched resemblances in the imago, and certainly shall not quarrel with anyone who differs from me on these points.

To sum up: After my examination of the larvæ last May, I had pretty well decided in my own mind that a relationship existed between *E. versicolor* and *Smerinthus*, and an examination of the pupæ, coupled with Mr. Buckler's remarks on its habits and their similarity to those I had observed in *C. elpenor*, strengthened the impression. Any doubts I had left were swept away by a perusal of Mr. Poulton's paper "On the Ontogeny of *Aglaia tau*" (*Trans. Ent. Soc. Lond.*, 1888). This species, unlike *E. versicolor*, has important characters in common with *Smerinthus* in its first stage, and after the first moult Mr. Poulton remarks that the young larva has a growth of shagreen dots exactly like those of *Smerinthus* and *Sphinx*, in which genera these structures also became prominent in the second stage; and he also remarks, "That a further resemblance is shown in the fact that each shagreen tubercle is terminated by a short bristle, with a clavate end." Speaking of the oblique stripes which in *A. tau*, as in *E. versicolor*, slope in the opposite direction to those of *Smerinthus*, he says, "Too much importance must not be attached to the fact that the stripes slope in the reverse direction to that commonly occurring in the *Sphingidae*, for undoubted *Sphinx* larvæ [e.g., the genus *Sesia* (*Macroglossa*)] possess similarly reversed stripes." Mr. Poulton considers the natural position of the *Sphingidae* and allied groups to be as follows: *Sphinx*, *Acherontia*, *Smerinthus*, *Ceratonia*, *Lophostethus*, *Aglaia*, *Attacus*, *Saturnia*; and remarks that *Endromis* will be found to occupy a position in this list. My idea is that *E. versicolor* would come somewhere between *Smerinthus* and *Saturnia*, but having no acquaintance with the genera Mr. Poulton places between them, I cannot venture on anything definite as to its position in the list. It seems also to be related to *Choerocampa* (*elpenor*), but in what degree I am not pre-

pared to say, as I have no knowledge of the early larval stages of this species. I have also a theory that *E. versicolor* forms a connecting link between *Lasiocampa* and the *Sphingidae*, but as I have nothing definite to go upon, I am not in a position to discuss the matter now.

#### RESEMBLANCES BETWEEN ENDROMIS VERSICOLOR AND THE SPHINGIDES.

**LARVA.**—*First Skin.*—(1) Caudal horn only faintly suggests that of the SPHINGIDES. It more nearly represents that of *Lasiocampa quercifolia*. *Second Skin.*—(2) Change in shape of head: *Smerinthus (ocellatus)*. (3) Dark medio-dorsal line: *S. tiliae* (in second skin). (4) Oblique stripes: as in *Sesia*. (5) Strength of the 7th oblique as compared with the others: *Smerinthus*. In further support I would point out that the oblique stripes are caused (in *E. versicolor*) chiefly by the absence of the shagreen tubercles on the stripes, and though in *Smerinthus* the reverse is the case with the stripes, the borders, at a certain stage, are caused in the same way (*i.e.*, by the absence of the shagreen dots). (6) The fact that the lateral lines are coloured, while the oblique are due at first chiefly to structural arrangements: *Smerinthus*. (7) Small, thickly scattered shagreen tubercles, each bearing one slightly clavate hair: *Smerinthus* and *Sphinx*. *Third skin.*—(8) Anal flap outlined with yellow: *Smerinthus*. (9) Darker bordering to oblique stripes: *Smerinthus* (? stage). (10) Ventral and anal prolegs developed much after the manner of *Smerinthus* (mentioned by Buckler). *Last Stage.*—(11) Retractable head when full-fed: *Choerocampa elpenor* (mentioned by Buckler). (12) Change of colour before pupation: *Sphinx ligustri* and *S. tiliae* (mentioned by Buckler). (13) Only four stages in ontogeny (three moults): *S. populi* (mentioned by Buckler).

**PUPA.**—(14) Shape and general aspect approaches *S. tiliae*. (15) Cremaster (in some characters): *S. tiliae*. (16) Movement in cocoon. Pupa forces its way partly out: *C. elpenor* (Tutt and Buckler). (17) Spines on free and following segments: *C. elpenor*.

**IMAGO.**—(18) Shape of wings (rough only): *Smerinthus*. (19) Scheme of coloration (rough only): *Smerinthus*. (20) Discoidal lunule on fore-wings (? too general to be of much use).

#### PECULIARITIES AND APPARENT DIFFERENCES.

**LARVA.**—(1) Colour of 1st stage. (2) Tubercles bearing more than one hair (1st stage). (3) Habits (as a whole). (4) Colour of shagreen tubercles (2nd stage). (5) Shape of head (2nd stage). (6) Additional stripe on horn or hump of the 12th segment (best seen in last stage). (7) Double row of black spots (dorsal) 2nd stage.

**PUPA.**—(8) Bristles on anal armature: As in *Saturnia carpiniv.*

### Some Named Varieties in the Larentiidae.

By LOUIS B. PROUT, F.E.S.

As I am afraid we may have to wait some time before we get a work dealing with the variation of the GEOMETRIDES on the lines of Tutt's *British Noctuae*,\* it has occurred to me that occasional unsystematic

\* I hope at some remote period to monograph my favourite family, the *Larentiidae*; but much preliminary study would of course be requisite, and I have no desire to rush into the work. I take this opportunity, however, of appealing to readers of the *Record* for any information of interest re the variation of species in this family.

notes on varieties, which come under my notice, may be of some interest. Mr. South, in the *Entomologist* (vol. xxv.) worked out some of the principal varieties in the genus *Melanippe*, but I am afraid that most of us have but little idea on the whole as to what Geometers have, on the Continent, received varietal names, and there is consequently great danger of our unconsciously multiplying synonyms. I subjoin a few notes on varieties and aberrations, to which my attention has recently been directed.

*Eupithecia venosata*, Fb. var. *nubilata*, Bohatsch (*Iris*, vi., p. 31).—Herr Bohatsch, in 1898, gave this name to our well-known dark Shetland form.

*E. denotata*, Hb. (*campanulata*, H.-S.) var. *atraria*, H.-S. 154.—We are somewhat behind the times in refusing to restore Hübner's name to this species; even Mr. Meyrick, who in his new work has made several needful corrections which I was glad to see, has retained the later name, *campanulata*, here. The form *atraria*, H.-S., has given a good deal of trouble, but has now been satisfactorily determined by Bohatsch as a large dark, mountain form of *denotata*, Hb. Its occurrence in England is, so I should fancy, somewhat improbable; at least, I am not aware that we get the species from any essentially mountain district. But as *atraria*, H.-S., was at one time supposed to be a melanic var. of *castigata*, the question has occurred to me whether it can have any connection with our so-called "Paisley pug." By the way, there is one curious thing about this "mountain form of *denotata*," if Bohatsch's conclusions are correct; he adduces as a synonym the *primulata* of Millière, which feeds upon the leaves of *Primula latifolia*.

*E. virgaureata*, Dbld. var. *altenaria*, Stgr. (*S.E.Z.*, 1861, p. 401).—Bohatsch has recognised *altenaria*, Stgr., as a northern form of *virgaureata*, smaller and more delicately built than the type-form, and with less distinct markings. I do not know whether it would run as far as our extreme unicolorous form.

*Melanippe sociata*, Bkh. var. *degenerata*, Hw.—Central fascia broken into costal and inner-marginal blotch. It would be well worth while to breed from a very narrow-banded female, if such were captured. Sintenis (*Sitzungs-berichte der Dorpater Naturf. Gesell.*, vii., 1886) has figured a most interesting series of var. *degenerata* and intermediates, bred by him from a female of that description.

*M. sociata* var. *cinpulata*, Tgstr. (*Notiser F. F. Fenn.*, xiv., p. 32).—The abdomen black with white rings; Tengström mentions no other difference from the type; but, as would naturally be conjectured, the hind-wings are also much darkened, especially in the basal half. I once bred six of this pretty form from a typical female from Sandown, and it is interesting that all the rest of the brood (some 30) were very uniform, and somewhat lighter than any which I have bred in two other large broods, and which I assume to be the normal form. Thus the 6 var. *cinpulata* (which were also pretty uniform *inter se*) contrasted most strikingly with their brethren.

*M. implicata*, Vill. (*montanata*, Bkh.) var. *degenerata*, n. var.—Staudinger's carelessness in chronology appears to have temporarily saved the opponents of "priority" from another of the unwelcome changes; De Villers describes and figures (very recognisably) *montanata*, Bkh., as *implicata*, five years before the appearance of Borkhausen's Geometer volume. I describe the variety *degenerata* as



having the central fascia broken into two blotches, costal and inner-marginal, paralld to the var. of *sociata* with the same name. Has this well-known form been already described earlier ? \*

*M. fluctuata*, Linn.—I am working up this species for a paper to be read before the City of London Entomological and Natural History Society in April. Can any reader inform me whether the var. *incanata*, Reuter (*vide.*, *Ent. Rec.*, v., p. 277) had, as suggested, "been before described as var. *virgata*," and if so where, and by whom ? The variety in question is that with the central band prolonged across the entire wing. [Was this described by Mr. Cockerell ? Ed.]

*Coremia spadicearia*, Bkh. (*ferrugaria*, Hw.) var. *confixaria*, H.-S., 334 (*vide.*, *Ent. Rec.*, v., p. 120).—I am able to announce this interesting form as British ; I detected (and secured) a specimen at the recent sale of Mr. Robson's collection ; it was in the series of *unidentaria*, and figured in the catalogue as "a very fine variety" of that species ; it is labelled "W. Reid, Pitcaple, 1892."

---

\* It is not unlikely that Staudinger's var. (et ab.) *lapponica* ("minor, dilutior, al. ant. fascia media dissoluta"), which I have not yet seen, includes this form ; in that case the new name will of course sink.

---

### How *Colias edusa* Winters.

By J. W. TUTT, F.E.S.

In Newman's *British Butterflies* (p. 145), we read of *Colias edusa*:—"TIME OF APPEARANCE.—August, September, October and November: it hybernates, but very frequently perishes before the spring; the survivors re-appear in May and June." Stainton gives "end of August to the middle of October" for the imago, and "middle of June to end of July" for the larva. He says nothing of how the butterfly passes the winter. Newman's *British Butterflies* has proved such a help to the collector, it has enabled him to name his captures so readily, that he has been willing to accept every statement in it as gospel. At least, that is the only explanation I can venture to give as to why we all agree with Newman's dicta, and stare in amazement at a contrary opinion. But in the *Ent. Mo. May.*, vol. xiv., pp. 150-151, Mr. Barrett expressed the opinion that *C. edusa* did "not hybernate in the perfect state." From larvæ obtained from eggs laid in August, 1877, Mr. Buckler got pupæ in October, but we do not, I believe, hear what became of the pupæ, but I do know from personal observation that just about the time and just after these larvæ had pupated fresh females were flying in the fields, and were egg-laying. Mr. C. G. Barrett captured a female *C. edusa* near Pembroke, which on October 12th laid some eggs, which Mr. Buckler received the following day, and from which larvæ emerged on October 27th. It was not until November that these late females were killed off, and, until they were, they continued to lay eggs. My recent consideration of the rationale of hybernation has led me to conclude that female butterflies which lay eggs in the autumn die and so do not live through the winter.

We do not learn, as I have remarked, what became of Mr. Buckler's pupæ that he obtained in 1877, between October 15th and October 27th, nor of the larvæ which hatched on October 27th of the same year, but in the *E. M. M.*, vol. v., p. 77, the late Mr. C. W.

Dale writes:—"I found a caterpillar of *C. edusa* last October at Charmouth; it changed to a chrysalis on our journey home, and died in the act of emerging at the end of March." It would be absurd I presume to assume that this pupa was not kept more or less under artificial conditions.

Mr. C. W. Dale, junr., records that "It (the imago) may be found throughout the year on the Continent, even as early as February, at Malta." This is a loose general statement, but we may assume that the appearance of *C. edusa* at "Malta in February" has been gleaned from a reliable record; at any rate, *C. edusa*, is recorded by Mr. T. Blackmore as common on the Dar-al-Clow range of hills 20 miles S.W. of Tangier (*E. M. M.*, vol. v., 299), the record reading, "Common at the end of February on the Dar-al-Clow, a range lying some 20 miles S.W. of Tangier. A few specimens taken close to Tangier a month later." Mr. G. T. Baker records it as common in February at Lambessa, and again in June with var. *helice*, at Guelma in Algeria (*E.M.M.*, vol. xxii., p. 251); and all spring reports from the European and African shores of the Mediterranean report this species as occurring regularly in February and March and again in June. Mr. Christy, from eggs laid at the end of August, 1892, discovered feeding larvæ on October 20th. These were removed to a warm greenhouse, where they pupated on December 20th, and after that were kept "warmer than they would have been in summer out of doors." This appears pretty strong evidence that the larvæ must have attempted to pass the winter in the larval stage under natural conditions.

I was for a long time a believer in the assumption (that I suppose I must have assimilated as a very small boy from Newman) that *C. edusa* hibernated in the imago state. Its occurrence in October and November in 1877 (my first real experience of an "*edusa* year") intensified this belief. But my observations on this species during the last two summers at the end of July and throughout August—in Savoy, Piedmont and the Austrian Tyrol—began to shake my faith in my former belief. I found *C. edusa* appearing very much as it does in England, and that it really was less abundant in the early part of August than it was in its special years in August at home. Now it had always been a pet theory of mine that early August would have found it going over in the southern valleys, and that larvæ would be feeding for the September brood. But I can only assume from the fact that from the middle to the end of August is their favourite time, that their progeny do not emerge until October (and then perhaps only partially), so that at least three appearances coincide with those in Britain, June (with our immigrants), August and October. But, as we have seen, we miss entirely the February brood, and get a clue as to the continued extinction of the species here, whilst at the same time the coincident appearances in May, August and October suggest how far our specimens are influenced by "heredity," and how far their habits remain as nearly identical as possible with those of their parents from warmer and more favoured climes.

We have now to consider, then, how the species passes its time from the October and November emergence until the February emergence, a period very little in excess of the time that elapses between the August and October emergences, and we may at once conclude that

there is very little break in the continuity of its life period. The well-known facts, recorded by Messrs. Barrett and Buckler (*Larvæ of Brit. Butts.*, i., p. 15) and observed by myself, *viz.*: that the females of the October emergence oviposit and that the eggs hatch, clear off in my mind the possibility of passing the winter in either the imago or egg state. It is equally clear that larvæ emerging in October will feed up more slowly than those emerging from the egg in August, and since (*loc. cit.*, pp. 13-14) in 1877 Mr. Buckler's August larvæ (eggs laid August 6th) did not pupate until October 15th-27th, more than two complete months, it is evident that eggs laid in October could in no wise be full-fed until January, and since an emergence takes place in February the pupal stage would be short. It is also possible that only a portion of the progeny of the August and early September butterflies feed up rapidly enough to pupate and produce butterflies in October and November, and that the remainder feed on slowly, and finally are caught by the progeny of their more precocious brothers and sisters, all emerging together the following spring. Mr. Hellins remarks on the different rates at which these feed, whilst Mr. Frohawk writes:—"It will be seen that the duration of time (in autumnal reared specimens) embraced by the different stages varies considerably, and is wholly influenced by the conditions of temperature to which they are subjected." At the same time it is quite possible that in some cases, as is so often the case with other species of butterflies and with moths, that the pupal condition might be prolonged, as in the case previously mentioned of one kept from October till March, by Mr. Dale, but even then it attempted to emerge at the normal time for the early (North African) brood, although it failed in the attempt.

It is doubtful whether, on the whole, the average cold of the warmer valleys bordering the Mediterranean littoral much exceeds that of an average October and November. In the face of this it may be well to quote a remark of Mr. Buckler, which states of his autumnal larvæ:—"The most forward had completed their last moult by September 21st, whilst others were not more than half an inch long. They continued to feed and grow, consuming a great deal of food, stripping bare the stems of plant after plant, appearing to be very hardy, not flinching in the least from any amount of water poured over them when the plants were being watered, apparently not noticing it in the least. On the approach of cold frosty nights they remained stretched out still and passive, seeming to feed only by day." Evidently, then, the larvæ were capable of standing "cold frosty nights," and to live and thrive in spite of them, for in spite of this exposure they fed up naturally, and soon became pupæ. This is only another evidence that the larva is capable of withstanding such cold, as in the more southern parts of the insect's distribution it is likely to meet, and further, that moderate cold by night does not prevent it making progress by day.

Mr. Frohawk, writing of a batch of larvæ which "commenced hatching on the 23rd September," says that "by the middle of October 170 larvæ were doing well, when a cold sunless week with frost set in, and proved fatal to all. None of them exhibited any intention of hibernating. So far as my experience with *C. edusa* goes, I am led to believe that it does not hibernate as a larva" (*Ent.*, xxvi., p. 187). This is exactly the result I should expect, considering as I do that in

its native haunts *C. edusa* undergoes no period of lethargy at all comparable with what we generally associate with the term hybernation. The great fatality from one week's cold is, however, in the face of Mr. Buckler's evidence, likely to be as much due to a wrong method of treatment as to the cold, unless the latter was very exceptional for the time of year; but that this is the final end of all British larvæ during the winter is almost certain.

If, as I have attempted to show, these are the habits in Britain of the progeny of our immigrating stock, it becomes more evident that the failure of *C. edusa* to live through our winter is less due to the cold than to the prolonged period of time through which the larva has to pass—often it would be from September to April—and that it has no habit ingrained in it in any stage which would enable it to become more or less lethargic for so great a period of time. A remarkable statement by that marvellous observer, Mr. J. J. Walker, occurs in the *Ent. Mo. Mag.*, xxiv., p. 176, where he says:—"In this genial climate (Gibraltar), some of the butterflies continue on the wing all the year round, and there is scarcely a sunny day in any month on which specimens of . . . *Colias edusa* . . . may not be met with in sheltered places."

The sum of the evidence forthcoming at present may lead us to doubt whether, in the true sense of the word, *Colias edusa* hybernates at all, and this is largely borne out by Mr. Frohawk's statement above. It passes, probably, the coldest period of the Mediterranean winter in the larval stage, the larvæ being in what we may term the "nibbling" condition, never wholly dormant, feeding up rapidly in early spring, and producing a brood of imagines at a period of the year which, in Britain, is usually most inclement, and totally unsuited for the existence in any stage of such an insect as *Colias edusa*.

### A Day at Lymington Salterns after Coleoptera.

By FRANK BOUSKELL, F.E.S.

This well-known locality, which we see so often mentioned in Canon Fowler's *British Coleoptera*, seems to have been very little worked during the last 10 years, if the records in our magazines are a fair criterion of what has been done.

Lymington makes an excellent headquarters for working the Salterns, the New Forest and the Isle of Wight, a sufficient variety of ground to suit anyone. The train and ferry service is good, and cheap accommodation can easily be obtained, even when Brockenhurst is full of our London brethren at holiday-time.

On June 2nd, 1895, a fine sunny day, we made a start for the Salterns about 9 a.m. On our way down the lane leading to the sea, the lane by the way being well worth sweeping, *Telephorus fuscus*, in one spot, was out in hundreds, crawling up the grass stems and other herbage. Last year in the same place we took only four. *Oedemera nobilis*, with its brilliant green glistening in the sunlight, was fairly on the wing, settling apparently only on the yellow *Ranunculus bulbosus*, and another allied species; *Meloë proscarabeus*, was picked out of the herbage, and many common *Telephoridae*, *Cuculionidae*, etc., found their way into the net, but the Saltern things were what we came for, so we must proceed.

On the banks of the disused Salterns, and in the marshes adjoining, we found plenty to do. In one little spot, on *Artemisia maritima*, we found a colony of the local *Polydrusus chrysomela*, and amongst the grass *Otiorhynchus rugifrons* simply swarmed; by shaking the grass roots a few *Gronops lunatus* were obtained. At the base of the bank, out of a heap of dry seaweed, by diligent searching we secured five *Bryaris waterhousei*, which looks uncommonly like a bug at first sight, and, from the same heap, *Oxytelus laqueatus*, *O. sculpturatus*, *Omalium riparium* and *O. rufipes*. Under very large stones below the high-water mark, and which were entirely submerged at high water, we found *Aëpus marinus* and *A. robinii*; both species appeared to be confined to a very small area, and in that occurring but sparingly.

Close to, under smaller stones, *Cilleus lateralis* was plentiful; we also found it running swiftly amongst the shingle. Amongst pebbles, and in the cracks in the mud, a few *Pogonus littoralis* were taken, in company with the common *P. chalceus*. Amongst some of the side refuse a few specimens of *Bembidium ephippium* were picked out, and a nice series of *Tachys scutellaris*, which is very local in the few places where it occurs. Canon Fowler thinks that some of the species of *Tachys* may have been imported with ballast, probably some have, but certainly not *T. scutellaris*. On the mud of the adjoining salt-marsh *Elaphrus uliginosus* was found at the edge of a brackish pool, and a few *Ochthebius bicolor*, whilst *Anthicus humilis*, as we thought, was running about in thousands. On setting those we took, about 20 per cent. turned out to be *A. salinus*, a much better species. Racing on the top of the mud were plenty of *Bembidium minimum* and *B. normannum*; not very easy to take, however, owing to the number of cracks. A dead seagull produced *Dermestes undulatus* and *D. murinus*, also several common species. *Paederus littoralis* was swept off a bank, and from under decaying seaweed *Cafius xantholoma* and *Quedius fulgidus* were fairly plentiful. Of course many common species were taken, but we have endeavoured to mention specially the things one does not meet with in the Midlands.

The above results are not bad for a single day's work, and doubtless a week's hard work would add many interesting species to the Lymington list.

## SCIENTIFIC NOTES AND OBSERVATIONS.

EUPITHECIA SUBFULVATA AND E. SUCCENTURIATA.—Mr. Sheldon's note in the February 1st number of the *Ent. Record* induced me to unearth and examine the pupæ I obtained last year. These were from larvæ found feeding on *Tanacetum vulgare* (tansy) at night, in my garden, and from the same plant as that on which larvæ were found the year before. I obtained eight larvæ altogether, which were full-fed at the end of October. I examined them very carefully, and although they varied in minor details, yet all appeared to be of the same species, with perhaps one exception. The colour of all was the same: A brown of the same tint as the ground colour of *Hypena proboscidalis*, with a chain of spots of various shapes running down the centre of the back; these spots were in different individuals—round, racquet and diamond shaped, with intermediate forms. The spiracular line was whitish, more or less well marked. The possible exception was decidedly

larger than the rest, and the spiracular line the most marked of all, and the dorsal spots somewhat pear-shaped, with the small end sharpish. The pupæ are, seven red or of *E. subfulvata* coloration, one brown with green wing-cases or of *E. succenturiata* coloration, and, moreover, the latter is decidedly larger than the other pupæ. Last year I had five or six *E. subfulvata*, and one *E. succenturiata*. I carefully searched the plant by day, but found no larvæ on it, and there were certainly none "stretched out and exposed," as Mr. Sheldon describes. So far my experience is much the same as it was last year, with the addition of having separated the insects in the pupal stage.—RICHARD FREER, M.B., Rugeley, Staffordshire.

EXTERNAL PARASITES OF LARVÆ.—Referring to the "current note" on this subject (*ante.*, p. 114), I found in 1894, on an alder leaf, a larva of *Orygia antiqua*, with similar parasites arranged along its sides, seven on one side and four on the other, looking like greatly swollen claspers. The description given by the Rev. T. A. Marshall (*Ibid.*), applies perfectly to these, except as to the colour; mine were cream colour or light yellow, not grass-green. I still have the imagines (or some of them) which emerged from these parasites, and if any of your subscribers would like to have them, so as to identify them, you are very welcome to them. Their bodies are brilliant metallic green, with pale yellow legs. Though badly preserved, they would probably be still recognisable.—J. WOLFE, Skibbereen, February 7th, 1896.

PROTRACTED PUPAL PERIOD OF PAPILIO MACHAON, ZYGÆNA TRIFOLII AND Z. FILIPENDULÆ.—Mr. Porritt sent me twelve larvæ of *P. machaon*. These in due time became pupæ, and six imagines emerged the following year, three the next, two the following, and the remaining pupa was alive and healthy the next spring, but was crushed by accident. Amongst other species not generally thought to stand over in the pupal stage I have bred *Zygaena trifolii* and *Z. filipendulæ* from pupæ which have gone on to a second year.—S. WEBB, Dover. February, 1896.

ERRATIC EMERGENCES OF *P. MACHAON*.—Referring to my note on *P. machaon* (*ante.*, p. 184), the other pupa, bred from the egg found at Wicken in June, 1894, disclosed its imago early in December, a good-sized, perfect and well-marked insect. Eggs, larvæ and pupæ have all the time been kept in my study, which has a fire every day in winter or every dull, damp or chilly day in summer, and they have been near the window, not near the fire nor in the sun.—E. C. STUDD, M.A., B.C.L., F.E.S. February, 1896.

THE TYPE OF *AGRONOMA*.—I have taken (in my *Bremen List*, 1895) *valligera* (*vestigialis*) as the type of *Agronoma*, but this seems incorrect, the species being stated by Mr. John B. Smith to agree with the subgenus *Agrotis* in not having heavily armed tibiæ nor a roughened or tuberculate front. Hübner's genus contains *crassa*, *cornua* (*tritici*), *valligera* and *exclamationis*, and is evidently proposed for species allied to those separated under *Feltia*, Walk., in the "Revision." I have no longer access to the material examined by me in 1898-4 in Bremen, but I have carefully studied in the Museum here specimens of *crassa*. The fore tibiæ are heavily armed, the front roughened or tuberculate, the male antennæ pectinate.\* *Crassa* is the type, then, of *Agronoma*,

\* Other species probably belonging here, which I have not yet examined, are *obesa*, *exclamationis* and *corticea*, perhaps also *graslini* and *fatidica*.

since (as stated above) *valligera* would be taken by *Agrotis*. The European species should be known as *Agrotis (Agronoma) crassa*, Hüb., since I am not prepared to accept the groups as distinct genera. But the tendency is to separate more and more, and it is well to fix the type of the genera in the *Verzeichniss*. The "Revision of *Agrotis*" is conducted by Mr. Smith upon a differentiation of characters first suggested by me, *i.e.*, the separation first of the species with unarmed tibiae, Lederer having left these species among the rest, and not having made the character one of main division. The classification adopted by Mr. Smith was only possible upon the selection of some species as type of *Agrotis*, and the author has followed me in adopting *segetum* as this type. From this starting point the distribution of the species can be safely undertaken, when we have satisfied ourselves as to what *Agrotis* really is. As far as *Agronoma* is concerned, with the type *crassa*, it would seem to include the American species, of which the proper title has been recently shown by Mr. Tutt to be *jaculifera*, Guen. My contention in the *Bremen List*, that this American species should be known as *Agrotis (Agronoma) jaculifera*, Guen., is not affected by my having given a wrong species as type for *Agronoma*, and seems a good one.—A. RADCLIFFE GROTE, A.M., Roemer Museum. February, 1896.

## REVIEWS AND NOTICES OF BOOKS.

TRANSACTIONS OF THE LEICESTER LITERARY AND PHILOSOPHICAL SOCIETY (1895).—[Published by Geo. Gibbons & Co., King Street, Leicester, 4 parts, price 6d. each].—Several matters interesting to entomologists will be found in these, as well as many articles interesting to scientific men generally. A paper by Mr. Bertram G. Rye, F.E.S., "Notes on the Varieties of the British Coccinellidæ," with a number of aberrations diagnosed, will have to be referred to by British Coleopterists when working in future at this group. "Some notes on Collecting in the Rannoch District," by the Rev. C. T. Cruttwell, M.A., is a readable paper, without any scientific pretensions. A great many papers on interesting entomological subjects appear to be read and not printed, but for a numerically small society the members are to be heartily congratulated on their energy and success.

PROCEEDINGS OF THE 7TH ANNUAL MEETING OF THE ASSOCIATION OF ECONOMIC ENTOMOLOGISTS.—[Washington: Government Printing Office].—This is full of most interesting entomological matter, both scientific and practical. The State Publications are so readily obtainable by British entomologists (we believe they are sent free, if applicant sends enough to cover postage), that we have no doubt that all entomologists interested in the practical side of entomology will obtain it.

## VARIATION.

VARIATION IN THE PSI-LIKE MARK OF *ACRONYOTA PSI* AND *A. TRIDENS*.—I recently observed in a bred example of *A. tridens* that the central line of the psi-like marking at the anal angle did not run into the dark line of the fringe, and that there was a distinct white gap between as we meet with in the allied species, *A. psi*. I had hitherto thought the continuity of the line with the dark line of the fringe, one of our

best points of differentiation. I have 18 specimens of *A. tridens*, all bred from the larva, and, in all, this continuity of the central black line of the  $\Psi$  to the end of the fringe is very marked, whilst it very rarely occurs in *A. psi*, indeed, amongst 17 specimens I only find one having it, and that is a specimen taken at sugar, and about which I am doubtful.—W. S. RIDING, M.D., F.E.S., Buckereil Lodge, Honiton. February, 1896.

I have ten bred *A. psi* in my series, in six of which there is a distinct gap between the dark *psi*-line and the fringe line, whilst in four there is no such distinct gap. In my series of *A. tridens*, including 26 bred specimens, there is no distinct gap in 22, whilst in four it exists as in the majority of the *psi*. One of these four was bred from the egg by Mr. Farren, one was bred by Major Robertson, and the other two, in one of which there is a very large gap, were two of three given to me by the late Mr. F. Bond, and stated by him to be *tridens*.—N. M. RICHARDSON, B.A., F.E.S., Monte Video, nr. Weymouth. February, 1896.

*HYPERMECTIA ANGUSTANA* VAR. *CRUCIANA*.—I bred this variety from sawallow leaves collected last spring in this neighbourhood.—W. S. RIDING, M.D., F.E.S. February, 1896.

This variety without the ferruginous tint used to be (and I dare say now is) exceedingly abundant on the dwarf sawallow growing on the Deal sand-hills. The larvæ used to spin together the terminal leaves during July, and the moth appeared in August, practically two months later than the redder type form occurred in the sawallow bushes in the woods about Rochester. I believe this difference in the time of appearance led to its being considered a distinct species. I have it from Deal and St. Anne's-on-Sea, where it appears to be a distinct local race or variety. At Chattenden and other localities it occurs as a scarce aberration.—J. W. TUTT. February, 1896.

*BLACK LARVÆ OF ABRAXAS GROSSULARIATA*.—During the last season I bred a moderate number of *Abraxas grossulariata* from larvæ out of my own garden at Croydon, but failed to get any aberrations worth mentioning. For two or three years I have bred the species from larvæ taken in a garden at St. John's, S.E., and feeding on *Euonymus*, where the few trees and shrubs are more or less stunted and covered with soot. There, quite black larvæ are not uncommon, and the imagines generally are more prone to variation, tending towards melanism. Although I kept the few black larvæ quite separate from the others, I did not find any appreciable difference in the imagines.—T. W. HALL, F.E.S., Stanhope, The Crescent, Croydon. February, 1896.

There can be no doubt the black larvæ are produced as a result of "natural selection," owing to the caterpillars resting on the black twigs. The habit of the imago will necessitate a totally different explanation to account for its variation, from that which suffices to explain the variation of the larva.—J. W. TUTT. February, 1896.

## NOTES ON COLLECTING, Etc.

*HABITS OF EUPITHECIA SUBCILIATA*.—Whilst at Torquay in August last (*ante.*, p. 185), I obtained *E. subciliata* in a restricted area (not more than 30 yards) in a wood sloping down to the sea. They were



all captured in the morning between 10 a.m. and 1 p.m., and were obtained by beating the trunk and branches of some old maple trees, from which they were easily dislodged, but not so easily captured, as they at once darted down the cliff where one could not follow them. I do not think we noticed more than one or two sitting at rest. There were many maple trees in the same wood, but *E. subciliata* seemed to be confined to one spot. The larvæ of this species feed on the flowers of the maple, and I believe mature very quickly.—(Rev.) E. C. DOBBS & Fox, M.A., Castle Moreton, Tewkesbury. *February, 1896.*

Some years ago I captured *E. subciliata* at Reigate Hill. There, too, its time of appearance was in August.—S. WEBB, Maidstone House, Dover. *February, 1896.*

THE TIME OF APPEARANCE OF *SCOTOSIA CERTATA*.—With regard to the Editorial note (*ante.*, p. 206) querying the appearance of *S. certata* in May, I would state that the insect always appears about that time. I have records from 1861–1895 for the species, the earliest date being April 27th, 1894, the latest June 8th, 1887. It swarms in this locality in May.—C. FENN, F.E.S., Eversden House, Burnt Ash Hill, Lee, S.E. *February 4th, 1896.* [The query was made by us in "pure ignorance." We apologise most humbly.—Ed.]

## NOTES ON LIFE-HISTORIES, LARVÆ, &c.

ON THE EGGS AND EGG-LAYING OF *EPINEPHELE JANIRA*.—With regard to Mr. Tutt's query (*ante.*, p. 208) on the method of egg-laying by *E. janira*, I would state that they are attached to various grasses all through the months of July and August. The eggs are yellow in colour, and, I think, smaller than those of other butterflies of similar size with which I am acquainted.—J. WOLFE, Skibbereen. *February 7th, 1896.*

DESCRIPTION OF THE CATERPILLAR OF *ACIDALIA DILUTARIA* (HOLOSERICATA).—Now that *A. dilutaria* (*holosericata*) is so prominently before British entomologists, the following description of the larva, made by myself in September, 1874, may be of interest, especially as the species has lately been under discussion:—"LARVA.—Very short and stout, tapering to each extremity, especially anteriorly. Skin warty and transversely wrinkled; incisions deeply compressed; 2nd segment swollen. Head small. Colour: Almost uniform dull, dark blackish-brown, with faint indications of whitish subdorsal lines on the posterior segments. Belly similar in colour, not warty. Feeds on the decaying leaves of low plants, rock-rose, *Polygonum aviculare*, groundsel, &c. In habit very sluggish. Rests in repose in the form of the figure 2." This larva is, indeed, a capital subject for a lazy collector, as it is perfectly happy as long as there is any decayed rubbish, not too dry, in the cage.—C. FENN, F.E.S., Eversden House, Burnt Ash Hill, Lee, S.E. *February 14th, 1896.*

THE PUPATION OF *ENODIA HYPERANTHUS*.—Newman states that the caterpillar suspends itself for pupation by attaching itself by the anal claspers to a silk web which it previously spins, and that "the cremaster of the pupa ends in a row of minute hooks, by means of which it adheres to the slight web which the caterpillar had previously spun, and from which it had suspended itself" (*Brit. Butts.*, p. 96). The Rev. H. Harpur Crewe says that "it lies in a slight cocoon at the grass roots and is hard to rear, requiring both moisture and sunlight." Are both correct?—J. W. TUTT. *February, 1896.*

ON THE FOOD-PLANT OF *SCIAPHILA COLQUHOUNANA*.—I can thoroughly endorse Mr. Gregson's statement (referred to *ante.*, p. 197) that the larva of *S. colquhounana* feeds on "sea-pink." Last year, in the Isle of Man, I devoted some hours to obtaining the larva of this insect, and was told by a friend with me, who has worked the insect for years, to look for a web spun on the cushion of this plant. The larva itself, a black and particularly lively creature, hides amongst the roots, where I am told it usually pupates in a long silken tube. That it does not invariably do so I can state positively, for, on one occasion, on a rock quite devoid of all vegetation with the exception of a few small stunted plants of sea-pink, sea-plantain, and a wiry plant unknown to me, from the cracks in which these plants grew, and from beneath all three indiscriminately, we dug out over six dozen pupæ, besides larvæ in all stages of growth. Had these larvæ remained undisturbed, in due course their cocoons would have protruded from the sea-plantain and thrift alike, leading to the supposition that they had fed thereon. I do not think that such is the case; I saw no signs, with the exception of the thrift, of any plant being eaten, and the larvæ I took refused to feed except on thrift, and fed up on that. May not Mr. King's finding cases protruding from lichens be on all fours with my experience, more particularly if thrift grew where his observations were made? I would add that the long series I bred were all of the form I understand to be *colquhounana*.—(Colonel) C. E. PARTRIDGE, 20, Hornsey Rise Gardens, Crouch End, N. February 4th, 1896.

[Colonel Partridge has explained that "sea-pink" is thrift. We observe that Mr. Meyrick refers to the larvæ of *S. colquhounana* feeding on *Silene maritima* (!) his want of knowledge of the local names of plants having evidently led him astray. We presume Gregson's original record led Mr. Meyrick to make this statement.—Ed.]

## CURRENT NOTES.

Mr. Banks records that *Elachista cingillella* is included in the British list on the strength of a single specimen (probably now in the York Museum) that Mr. Allis possessed, and taken in the North of England some years previous to 1859.

Mr. G. C. Dennis, of York, captured several specimens of *Halesis guttatipennis* at Pickering on November 9th, 1895, the species being in great numbers. Previous to this only three British specimens were known.

Simultaneously with our suggestion that the King's Lynn species of *Argyresthia* should be called *atmorella*, Mr. Eustace Banks described it under the name of *A. atmoriella*.

Mr. G. C. Champion points out (*E. M. M.*, February), that two species of beetles, both found in granaries, bakehouses, etc., in London and elsewhere, have hitherto been included in British collection under the name of *Palorus* (*Hypophloeus*) *depressus*. The specimens previously named thus appear to belong either to *P. ratzeburgi*, Wissm., or *P. subdepressus*.

## SOCIETIES.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—January 7th, 1896.—Exhibits:—Mr. Prout: Continental types of species

and varieties of the *Caradrina quadripunctata* group, viz.: *C. selini* (Germany); var. *anceps* (Syria); *C. menetriesii* (Siberia); *C. albina* (Russia), and *C. infusca* (Central France). With the exception of the typical *C. selini*, all the specimens bore a very great resemblance to some of the forms of *C. quadripunctata*. Mr. Bate: a very dark specimen of *Luperina testacea* from Dulwich. Mr. Sauzé: *Melanostoma quadrimaculatum* (Sydenham, March, 1895), and *Oxycera trilineata* (Deal, July, 1895) amongst other Diptera. Mr. E. Heasler: 4♂ *Selidosema ericetaria*, *Pseudoterpna pruinata* (three specimens, unusually green considering that they had been captured); two extreme forms of *Gnophos obscurata* (deep black and ash-grey, respectively), and *Acidalia straminata*, one of which had a distinct dark band, generally considered to be the distinguishing mark of *A. circellata*, all from New Forest. Mr. Frost: two *Epinephele hyperanthus*, with xanthic blotches; a very dark *Hadena dissimilis* var. *confluens*, closely resembling the dark purplish forms of *H. oleracea* and a short series of *Noctua glareosa*, all from Ipswich.

February 4th, 1896.—Exhibits:—Mr. Prout: a short series of *Hydroecia lucens*, from the Kyles of Bute. Mr. Bloomfield: a short but prettily marked series of *Oporabia dilutata*, bred from Ringwood pupæ, and bearing some resemblance to *O. filiagrammaria*. Mr. J. A. Clark: a beautiful series of *Agrotis tritici* from Howth (Ireland). Mr. Tutt remarked that the form with the pale costal streak seemed unusually prevalent in this locality, if the series exhibited was a typical one. Mr. Fuller: an old book entitled, "A Collection of Curious Insects," published by Laurie and Whittle, and dated 1794, though the series of 13 copper-plate engravings seemed older than that. Mr. Riches: living specimens of the slug, *Testacella haliotidea* from Hornsey Rise. Messrs. E. Heasler and W. I. Cox showed specimens of Dulwich insects to illustrate an amusing and instructive paper, read by Mr. D. C. Bate, on "The Lepidoptera of Dulwich." Mr. Tutt exhibited a specimen of *Blaps mucronata*, on behalf of Rev. C. R. N. Burrows, who had taken it in his cellar, and read the following notes from that gentleman:—NOTES ON *BLAPS MUCRONATA*.—"I packed this beetle under the impression that it might be something new to science, but appear since to have identified it as *Blaps mucronata*, of which Mouffet in his *Theatre of Insects* writes as follows:—'It is of a pure black glistening colour, very slow paced, as no creature the like, the body so framed and ordered that you would swear it were winged, and had sheath wings; nevertheless none of them have any wings, no, not the male itself, among this sort of them, whatever Pliny dreameth to the contrary. It hath long, slender, thin shanks; remains in dark cellars; it creepeth very slowly, but at the least glimpse of light and whisper of talk she hides herself; a shame-faced creature, certainly, and most impatient of light, not so much for its ill-favouredness, but the guiltiness of its conscience in regard of the stink it leaves behind it, and of its ill-behaviour, for it frequents base places, and digs through other men's walls, and doth not only annoy those that stand near it, but offends all the place thereabout with its filthy savour. The mouth of it is forked, the back covered (as it were) with a sheath-wing, so solitary a creature that you shall scarce find two of them together.' It is rather remarkable that Mouffet, though he persistently calls the insect which he is describing a 'Blat,' and is good enough to place it amongst the Moths, gives a

really fair figure of the *Blaps*, and a very good description of the insect. Alluding to the then popular notion that the imperial purple dye (which was kept a profound secret by the few dyers who knew how to prepare it) was made from the *Blaps*, he proceeds as follows:—‘These little creatures, though they are baleful to nature itself, to men and to bees, yet God hath endued them with sundry virtues, in which they exceed the *Blattæ* Bizantine, for take off his shell or mail, which is thin between its head (which is called *Papaver*) and its neck, what doth the belly contain but the ornament to dye withal, and to delight the eyes with their colour. The *Blaps* is a certain cure for ear-ache if beaten up with old wine, honey, pomegranate-rind, unguentum syriacum, apple-juice, tar and onion.’ This delightful mixture is to be boiled in a pipkin and, when cold, to be poured into the ear.—(From Wood’s *Insects Abroad*, pp. 179-180).’’

Mr. Bacot exhibited a large number of imagines of *Psilura monacha*, to illustrate the following NOTES ON THE BREEDING OF *PSILURA MONACHA*.—‘‘From moths bred in 1893 from New Forest larvæ I obtained two batches of ova called respectively No. 1 and No. 2. No. 1 was laid by a dark ♀ (♂ unknown) and produced nearly equal numbers of light and dark forms. No. 2 (parents unknown) produced pale forms only. A number of these moths were paired, and I selected four batches of eggs to breed from in 1895; these I lettered I, E, B and A. I and E were inbred from No. 1; A was bred from No. 2; and B was from a cross between No. 1 and No. 2. My notes on the moths reared from these four batches of ova are as follows:—Brood I. (Parents: a dark and suffused ♀ with a strong, but clearly marked ♂):—Sexes are equal 13 ♂s, 14 ♀s. The females, with the exception of one, which is lighter, are all as dark or slightly darker than the ♂ parent, only two having any tendency to the blurred and suffused central band of the ♀ parent. Of the 14 ♀s all but one are more or less dark and suffused, some to a greater extent than the ♀ parent. Brood E. (Parents: a dark and suffused ♀ with a normal ♂):—8 ♂s and 11 ♀s:—Four of the ♂s are much darker, three are about the same shade, and one is slightly paler than the ♂ parent. Of the ♀s two are slightly darker than the ♀ parent, the remainder having the suffused tendency to only a slight extent. Brood B. (Both parents pale). Shows a large proportion of ♀s, 26 against 14 ♂s, variation of colour slight, all follow the parents closely. Brood A. (Parents rather strongly but distinctly marked). 11 ♂s, 12 ♀s, follow the parents closely, general tendency for the markings to be strong and clear. The suffusion of colour in Broods I and A seems to arise chiefly from the darkening of the generally faint and interrupted line parallel to, but on the inner side of, the elbowed line. There is on the whole a tendency to breed true, and for the ♂s to follow the ♂ parent and the ♀s to follow the ♀ parent.

I paired a number of these moths bred last year, and on going through my boxes containing the ova I made the following notes: IN-BREEDING.—Of two pairings of I with I one produced no ova and the other a fair number of apparently fertile ova, the ♀ in the latter case was a cripple; of four pairings of B with B, all produced medium to large batches of ova all of which look fertile. CROSSING.—Of three pairs of I with E (1) produced a few ova, not all fertile, (2) very few ova and very few of these fertile, (3) a few ova all or nearly all fertile. One pair (A with B) produced a fair batch of ova, most look fertile. One pair (A with I) produced

a lot of ova, all of which look fertile, the ♀ was a cripple. I also paired a ♀ of A with a ♂ bred from a larva beaten in the New Forest last year; very few ova were laid and none of them looked fertile. It will be seen that brood B seems more prolific of fertile eggs than the other three, probably this is owing to the parents of this brood having been of different stocks. It is also remarkable that both the crippled ♀s of brood I (one of which was paired with a ♂ of the same strain, and the other with a ♂ of brood A), produced fair-sized batches of apparently fertile ova, while well developed ♀s of the same stock laid few if any fertile ova. I found much greater difficulty in pairing dark moths with dark moths than in crossing light with light or light with dark, and this quite irrespective of their being of the same or different broods." Mr. Bayne exhibited the following aberrations: *Polyommatus icarus*: males of the following forms—(1) Lilac blue. (2) Bright blue. (3) Bright dark blue. (4) With slight trace of black spots on hind margins of wings. *Coenonympha pamphilus*: (1) Pale form from Aylesbury. (2) Dark form from New Forest. *Plebeius aegon* (undersides) from the New Forest: (1) With slightly coalescing spots. (2) With spots on hind-wings forming a short band. (3) With the last pair of spots on fore-wings wanting. Also specimens of *Polyommatus astrarche* and *P. icarus*, showing parallel aberration to the *P. aegon* marked 3 above. *Hybernia defoliaria*: (1) With strong melanic tendency. (2) Dark unicolorous form. (3) With band continued across the hind-wings. (4) Two forms of the female—typical and melanic. Mr. May recorded a specimen of *Phigalia pedaria*, seen on a lamp at Tooting, on January 26th last.

THE ENTOMOLOGICAL SOCIETY OF LONDON held a meeting on February 5th, 1896. Mr. Waterhouse exhibited pupæ and portions of pupæ of a silk moth, *Antheraea mylitta*, selected from some scores of specimens, which he had opened to see if they showed stages of development agreeing with the examples given by Dr. Spüler. The results appeared to confirm Dr. Spüler's researches; some specimens showed the tracheæ, the median vein having two branches, very rarely emitting a third branch in the direction of the radial. Other specimens had faint indications of the veins and of the discoidal spot of the imago. Even at this very early stage the vein branching from the subcostal vein to unite with the upper radial, and the short branch uniting the second median vein with the third median were distinctly traceable, no tracheæ being yet visible in these branches. Mr. E. E. Green remarked that in the *Trans. Ent. Soc. Lond.*, 1881, p. 601, there was a short paper by the late Prof. J. O. Westwood, describing a curious little insect from Ceylon, under the name of *Dyscritina longisetosa*. Prof. Westwood believed his typical specimens to be immature. Mr. Green exhibited what he supposed to be a later stage of the same species. He said his example differed in some particulars from Westwood's description and figure—notably in the proportions of the caudal appendages. Prof. Westwood pointed out the affinities of *Dyscritina* to the *Forficulidae*. This was very apparent in the specimen under consideration. Putting aside the nature of the caudal appendages, the insect was in all particulars an earwig. The present specimen was taken in the Punduloya district of Ceylon, at an elevation of about 4,000 feet. Mr. Green said he had more than once seen this insect under loose pieces of bark and in crevices of rocks, and had always been struck by its likeness to an earwig, both in appearance

and habits. Mr. O. E. Janson exhibited a Goliath beetle, from the Upper Congo, which he believed to be the male of *Goliathus russus*, Kolbe, described from an unique female example in the Berlin Museum. Mr. Blandford called attention to the case of the eye of a boy affected with inflammation caused by the hairs of the larvæ of *Lasiocampa rubi*, the attack recurred after an interval of nineteen weeks, and in several Continental cases this recurrence of the attack had been found to take place, and in some cases permanent injury to the eye had followed. Mr. Blandford discussed the various kinds of hairs on several caterpillars, certain species having hairs of three kinds, one kind being barbed, and thus having the power to work into the skin. He said that the urticating property of the hairs appeared to be mechanical: there was no evidence of any poison glands. Dr. Lawford said he had had some difficulty in discovering hairs in the lid, and he thought that the symptoms in the case in question were not to be explained by mechanical irritation alone due to the presence of hairs in the tissues. The subject was a new one to him, and he had looked up all the medical literature bearing on it.

THE PENARTH ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY met for tea at the chairman's house on the 28th ult. During the evening the following, among other subjects, were discussed: Dr. G. N. Dunn, M.R.C.S., gave a resumé of the accounts of the so-called new discovery by Professor Rontgen. Certain rays of light, or energy, emanating from a Crooke's vacuum tube, lighted by electricity, were found to pass through certain bodies hitherto considered opaque. For example: an impression was obtained of the bones of the hand through the flesh, and even through a plate of aluminium. In seeking to repeat the experiment he had failed for want of sufficient electric power. The successful operator, Mr. Campbell Swainton, had employed apparatus almost identical with that used by Nicola Tesla, at his epoch-making lecture given at the Royal Institution, February, 1892, and obtained his power from the electric-lighting mains. Dr. Dunn's opinion as a surgeon was that the discovery was more curious than practical in his profession. Mr. A. H. Trow, B.Sc., gave a short account of the "Material Basis of Heredity," illustrated by the microscope. He showed that the germ in all cases, both of plants and animals, consisted of the same component parts, *viz.*, a cell of protoplasm in which existed a minute nucleus. These nuclei, in the animal, closely resembled each other, until the male and female germs combined, when the bundle of threads, as these nuclei appear to be, and which seem to be inextricably entangled, broke up into pairs of rods, varying in number according to the species. From these pairs evolved the offspring, partaking of the characteristics of both parents usually; but an irregularity in this order of procedure would most likely involve a turning back to the characteristics of earlier ancestors. The generation of plants was more complex, there being frequently an intermediate state. For instance, the spores of ferns do not produce ferns, but a flat-lying plant, from beneath which the ferns are finally produced. A cell so tiny as to be absolutely beyond the power of the human eye to differentiate, might eventually become an elephant or even a Wellingtonia. Mr. C. W. Williams, the chairman, read some notes on *Sirex gigas* and *S. juvenis*, to settle a disputed point. These insects belong to the tribe *Xylophaga*, which feed upon and burrow

in the wood of trees. The two species, unlike the *Phyllophaga*, which feed upon and deposit their eggs in the softer portion of plants, cannot withdraw their ovipositors into the abdomen, but they project in a most conspicuous manner, obtaining for these with country people the name of tail-wasps. The ovipositors consist of two double-jointed plates, the second joint of each being prolonged so as to form a sheath, within which are three bristle-like organs, the upper being the largest, and channelled for the reception of the two others, which together form an expansible tube for the passage of the egg. These three bristles are serrated. The larvæ have only the six thoracic legs, amply sufficient for their mode of life, in the burrows of the wood. Their jaws are remarkably powerful, instances being known, notably during the Crimean war, of their having gnawed through solid lead. *S. gigas* is frequently found in this country; *S. juvenus* much more rarely. There is a marked difference between them. The female *S. gigas* has the thorax, base of the abdomen on the underside, and a broad band around it, of deep black. The rest of the body and the sides of the head are yellow. The thighs of the hind-legs and the bases of the others are also black, but the rest of the legs and the antennæ are yellow. The abdomen is terminated by a straight pointed tail, about five times as long as its diameter, with the ovipositor beneath, and projecting beyond it about an equal distance. The male is considerably smaller, and is black, with a broad yellow ring (4 segments) around its middle. The hind-legs are black, very strongly developed, with yellow joints. The other legs are yellow. The antennæ are black. The abdomen is terminated by a short, flat, broad, V-shaped tail. The wings are much paler than those of the female, which are a deep gold bronze. *S. juvenus* (female), is easily distinguished by its deep metallic blue body. It has yellow legs, and its pointed abdomen closely resembles that of the male *S. gigas*, the ovipositor being like that of *S. gigas* female. It is rarely recorded. Occasionally, it has obtained a footing for a short period in England, as one of the members, Mr. Drane, has taken it frequently when a boy. It does not appear to thrive. *S. gigas*, on the contrary, is very frequently captured, and a log of pine cut down at Southerndown was recently exhibited, which was honey-combed by this species. The writer suggested a use for the horny tail. Every entomologist has witnessed the crane-fly ovipositing, standing upright on her hind legs, and probing with her tail until a suitable place is found, and then pausing a second to lay her egg. He believed observation of the *Sirices* would reveal a similar process. The ovipositor he assumed to be capable (its unique attachment to the middle of the abdomen favouring the idea) of being bent forward by its hinge-like joint towards the thorax. Being thus out of the way, the horn is brought into requisition by the insect standing upon its hind legs, holding on by its splendid claws, and feeling with it for a suitable crevice or soft place in the trunk. When that is discovered the ovipositor is brought back into position, the jointed plates turn aside to right and left, and the boring proper completed, with the united and flexible triple-edged saw, the insect now standing on all its legs. The tube is then expanded by the loosening of its component parts and the egg deposited. The hope was expressed that the members would endeavour, if the opportunity occurred, to confirm this suggestion or otherwise.

# The Entomologist's Record

## AND

### JOURNAL OF VARIATION.

---

VOL. VII. No. 11.

MARCH 15TH, 1896.

---

#### **Cænonympha tiphon (davis) at Home.**

By J. E. ROBSON, F.E.S.

In Mr. Barrett's *British Lepidoptera* he states that *C. davis* has been exterminated in Northumberland. My attention was called to this error while I was hunting up the various records of this butterfly, for my forthcoming *Catalogue of the Lepidoptera of Northumberland and Durham*. This led me to turn up the notes I made three or four years ago, when I captured this butterfly in Northumberland, and they are now given to your readers, as I fear any future communications from me, will be more in the nature of past experiences than present observations.

On Wednesday, July 16th, 1890, I had arranged to visit the Northumberland moors, if the weather permitted. The continued rain of nearly a month before made it doubtful if the latter condition would enable me to make the journey, but the previous day, the anniversary of the lachrymose Saint Swithin, was bright and fine and cloudless, and I rose at 3 a.m. with every prospect of a grand collecting day. The trains were exceedingly awkward. The earliest from Hartlepool did not reach Newcastle till ten minutes after the north train left that city, and I had to ingratiate myself with the station-master to obtain permission to travel by an empty train that ran to Ferry Hill Junction to meet the mail. This landed me in the northern metropolis at 5.50 a.m. The train by which I had to proceed on my journey did not leave Newcastle till 8.20 a.m., so I had a delightful two hours and a half to wait. I took a long ramble through the streets, but the unopened shops were not attractive. I read the morning papers, had breakfast, "dawdling" as much as possible over it all. At last the weary time was over, and I took my train for the north. Station after station was passed in rapid succession, Rillingworth reminding one of Stephenson, to whose great invention I was then so much indebted, and without which my capture of *C. davis* would not have been easy of accomplishment. Place names began to have an unfamiliar sound, and Northumbrian as I am, I could not give the fine roll to the R that I heard as Cramlington and other sonorous names were called out by the porters. Morpeth reached, a change of carriage took place, and I found myself on the North British Railway. The railway from Morpeth is a single line only, and it was rather odd to see the "staff" handed to and from the station-master before the train could proceed. This always seemed a clumsy contrivance, but



every precaution is needed on single railway lines, for all our modern inventions have not yet enabled two trains travelling in opposite directions to pass each other on the same line of rail. But we must live in hope. This apparent impossibility is already accomplished with the electric telegraph, where messages may be sent simultaneously in opposite directions on a single wire, and we ignorant 19th century folk must not say "impossible" to anything.

At the second station beyond Morpeth—Augerton, I was joined by Mr. Finlay of Meldon, whose familiarity with the home of the insect I sought, made my quest easy and advantageous. At Long Witton we alighted, the remainder of our journey being made with the able assistance of "Shanks his nag." For a mile or more we pursued our way over a tolerably good road, Mr. Finlay from time to time pointing out what he considered objects or places of interest, most of them connected with our favourite pursuit. Rothley Craggs was noticed as the best place to take *Larentia caesiata*, an insect I had already taken on the Durham moors about Caldron Snout and High Force. I asked if the hills looming in the distance were the Cheviots, but was answered almost in the words of the dramatist—

"The Cheviot Hills you cannot see,  
Because they're not in sight"—

the Simonside range, to which my gaze had been directed, intercepting our view of the more distant Cheviots. My local knowledge thus proving so miserably deficient, I contented myself with asking what this or that might be, but making no further attempt to expose my ignorance of the locality. Yet I nearly committed myself in another way. My day had been so long already that I forgot it was yet morning, and thought the sun was now in the west. Mr. Finlay, however, saved me the exposure by pointing to Cambois, and naming the direction in which it lay. We were now approaching the moors, and the character of the vegetation was charming. The softer grasses of the meadow and pasture were replaced by sedges and carices. Ling and heather varied with the turf. A single brown moth flew up at my feet; it was quickly captured, and proved to be *Tortrix riburiana*, a species only found on northern moors. I felt inclined to linger here and secure a series, but Mr. Finlay urged me on, for the day, though still fine, he said, might not continue so, and we could obtain this when returning. Pointing to a wall, perhaps a quarter of a mile further on, my companion said, "Once beyond that wall and we shall find *C. darus*." But he had scarcely uttered the words when a brown butterfly flew up, and I saw *C. darus* alive for the first time. A short chase, and I secured the prize for which I had journeyed so far. "Now," I said, "I am content. If I get no more I have at least accomplished the object of my journey;" but there were plenty more, though the sun, which had shone brightly till now, was obscured at intervals by passing clouds. As soon as the sun ceased to shine, the butterfly ceased to fly, and we had to wait the passing of the cloud before we saw it again. I took the opportunity of these cloudy moments to examine the nature of the ground. It was called a moor—Greenleighton Moor—but it was a bog to all intents and purposes. By stepping on the tufts of heather we could keep our feet tolerably dry, but it was not easy to run, and there was water between all the tufts, and plenty of it. It was easy to push our sticks

their full length into the soft mud, and easy to draw them out, but I found when my foot went deeply in, that it was not so easy to get my boot back again. Laced boots, not elastic-sided ones, as mine were, were the proper thing to wear there. Patches of red attracted my attention, and stooping to examine them, I found these were plants of the round-leaved sun-dew (*Drosera rotundifolia*), which I had never seen before except as a herbarium specimen. I secured several healthy-looking plants for home growth, and may as well say here that the leaves produced under glass were green, not red as in their lofty home. Sweet-gale, or bog-myrtle (*Myrica gale*) was there, but not abundant, and I had the pleasure of seeing the bog-asphodel (*Narthecium ossifragum*), a lovely flower, for the first time. A keeper came up to us; he thought we were catching young grouse, and had run a mile or more to stop us. I am not sure that he was not more angry because we were not doing so than he would have been had he caught us in the act. Mr. Finlay now called my attention to the female *C. davus* he had taken. They are much paler than the males. His mode of pinning them into a box afforded an opportunity for examination which my habit of boxing did not. *Agrotis porphyrea* was not uncommon, but rather worn. I managed to secure one or two tolerably good specimens, and found them not so red as those I had taken in the drier Yorkshire moors. *C. davus* was tolerably abundant, and we might have secured a goodly number had the sun shone brightly, but it gradually grew more cloudy, and at last my friend called my attention to what was evidently rain falling on the Simonside Hills. Just then a moth flew quickly up, but my net was quicker and I secured it, a lovely *Anarta myrtilli*. A large Tortrix—*Microdia schultzeana*—was the next capture, then a second *A. myrtilli*, a second *M. schultzeana*; other things, too, were on the wing, and we were likely to do well, when to my great dismay, rain began to fall, first a few drops, and then a heavy shower. For a little time I persevered, in hope that it would pass, but the rain increased, and our nets were soon saturated and useless. There was nothing for it but to make for shelter—two or three miles away, and we very reluctantly began to retrace our steps. Before quitting the moss I managed to secure two fine specimens of the Heather pug, *Eupithecia nanata*, evidently just out. I boxed them as they sat, and they added another item to my regret at the change of weather, for they were considerably different from those I had met with in Durham. But there was no shelter on the moor. We looked with longing eyes at a wooden shooting-box, but it was securely fastened up, and after trying a stone wall, which gave us no protection from the perpendicular rain, we at last got a little shelter under a tree, taking the opportunity to eat our lunch, and thus fortify ourselves as well as we could from the effects of our drenching. Mr. Finlay most kindly gave me his captures, which, with those I had taken myself, made a respectable lot.

*C. davus* from this locality is somewhat intermediate between the Lancashire and the Scotch forms. In hue it resembles the Scotch specimens, but the underside is more ringed, and the light fascia more distinct, but not nearly so much so as in those from Chat Moss or Risely Carr.

**On *Alucita* (Orneodes) *hexadactyla*, chiefly in relation to the structure of the Pupa.**

By T. A. CHAPMAN, M.D., F.E.S.

This moth hybernates; it lays its eggs in the spring on the flower-buds of honeysuckle, at a time when the corolla is about a quarter of an inch in length. The eggs are deposited on almost any part of the corolla or on the margin of the calyx; they are at first whitish, then become yellow, and finally orange in colour; their length is about .48 mm., their width .26 mm., and in shape they are cylindrical, but with flattened sides, giving a somewhat brick shape with somewhat truncate rounded ends; their surface is minutely sculptured, with irregularly raised lines and pits. They are readily seen, and are thus easy to find on the growing heads of flower-buds of the honeysuckle; often more than one is to be found on a head.

When the egg hatches, the young larva immediately makes its way through the corolla into the interior of the flower, and seldom wanders far from the egg before doing this; it eats its way in very deliberately, making a minute hole, and leaving a little frass outside. Both at this stage and at later stages of its career its movements are very slow and deliberate. From this point its food consists chiefly of the pollen of the flowers, but it also eats the filaments of the stamens and the styles of the pistils, and will gnaw the inner surface of the corolla; from time to time it emerges from one flower, sometimes after having devoured merely its pollen, and enters another by a small round hole. When full-fed it emerges in the same way, and spins a slight but tough cocoon, in which it pupates. I have not at present ascertained where the cocoon is situated in a state of nature, but it is in or on the surface of the earth.

The young larva is nearly 1 mm. in length, pale in colour, and has fine bristles apparently at the same sites as the tubercles of the full-grown larva, the bristles being nearly two-thirds the diameter of the larva in length. The true legs are long and three-jointed, with terminal claws, and a battledore-shaped appendage of larger proportions; the pro-legs are well developed, but, apparently without hooks. The head has a large, simple eye-spot;\* the jaws contain four strong teeth, of which the second is the largest, and three weaker and shorter ones, one of these being on the posterior, and two on the anterior margin; the antennæ consist of two short thick joints, the latter bearing an inner process with two, and an outer with one hair; the maxillæ are large, and besides two small inner processes, have a large outer palpus of two joints, carrying two bristles; the labium carries a spinneret and two minute bristle-bearing palpi.

The segments are sub-divided by a pale depressed line a little behind the middle into two sub-segments, of which the posterior carries the posterior trapezoidal tubercle, the anterior, the anterior trapezoidal, the supra-spiracular tubercles and the spiracle. On each sub-segment is a longitudinal depression just above the level of the supra-spiracular tubercle; there is a marked sub-spiracular flange in which is the sub-spiracular tubercle.

The full-grown larva is thick and sluggish. The tubercles

---

\* In many young caterpillars there is a single pigment spot, or mass, but several separate lenses.

present are:—anterior and posterior trapezoidal, one supra-spiracular, two sub-spiracular, or rather one with two bristles, and two marginal, represented by hairs whose length is about one-sixth of the diameter of the larva; there are two hairs on the foot base, the skin is rough, with very minute sharp spiculæ  $\frac{1}{100}$ th of a millimetre in length. The jaws are not so much like a mole's paw as are those of the newly-hatched larva, but are of a solid triangular form, with the inner surface rather hollow and scoop-shaped just below the teeth; the antenna is the same as in the young larva, save that it is rather more slender; the two terminal processes are of about equal size, and each has two hairs with a long stiff bristle between them; the maxillary palpi also are like those of the young larva, their terminal bristles comparatively minute; the labial palpi have a long basal joint and a short terminal one carrying a bristle. The legs have three joints, each furnished with half a dozen hairs, and terminate in a well-hooked claw, the battledore appendage being very small. The pro-legs have complete circles of fourteen strongly curved hooks at the end of a short pedicel; the anal pro-legs have twelve hooks situated on the margin of a rather open horse-shoe. The hairs are longer on the head and on the 10th abdominal segment than elsewhere.

The pupa remains in the cocoon on the emergence of the imago; only the 5th and 6th abdominal segments are movable, the wing and leg-cases being attached to the first four. On the emergence of the imago, the wing-, antenna-, and leg-cases remain attached together, the antenna-cases separating from the head. The pupa is 6 mm. in length, and in general proportions and outline is very like that of a *Noctua*, say of *Orrhodia vaccinii*. It is pale brown and somewhat delicate; the terminal armature also reminds one a good deal of that of a *Noctua*; it consists of a double bunch of hooks, ten or twelve in number, with slender shafts; these are curved and cross each other lyre-fashion, their extremities being a little flattened, and curved round into a small closed circle. The hairs present are two on each thoracic segment and one on each abdominal segment on each side, one above and one below each abdominal spiracle (where not covered by wings). The hind-wings do not finally disappear beneath the fore-wings till near the hind margin of the fourth abdominal segment. The customary six abdominal spiracles are large and well developed, as also is that of the first abdominal segment beneath the wings. The first spiracle is likewise large, and is protected by the usual shield of pro-thorax, which is finely spiculated. The labium and jaws are better marked than usual, whilst the cheek beside projects downwards and terminates in a right angle, the central portion of the maxilla occupying the intermediate space. The front appendages are the two antennæ, which terminate level with the second pair of legs and a little short of the wings—the third pair of legs appear from beneath the second and project a little beyond the wings; the first pair of legs are nearly three-fourths of the length of the wings, and fall a little short of the maxillæ; the femur and trochanters of the first pair of legs appear between the maxillæ and the first legs, even more than is the case in many *Noctuides*. There are no maxillary nor any labial palpi. The wings are rounded in place of having an anal angle, but are squarer at the apex than in most of the

TINEINA which are so characterised. The first pair of legs are cut off from the antennæ by the second pair.

The peculiarity which separates this pupa from all the others that I have examined is the immense size of the dorsal head-plates (cephalo-thoracic pieces), compared with the very narrow and dwindled pro-thoracic plate, so that at a casual glance the latter is overlooked and the former mistaken for it. This plate exists in many of the PYRALIDES, so that the exaggeration of it in the species under consideration does not necessitate its severance from that section; another feature, which is not rare in the PYRALIDES, is that the wing- and leg-cases, etc., though attached only as far as the fourth abdominal segment, yet project freely beyond it; the wing-cases as far as the posterior margin of the fifth, and the leg-cases to the middle of the sixth segment. There is also a tendency for the fixed incisions of the abdominal segments (1st to 4th) to open a little in dehiscence. The 7th, 8th, 9th and 10th segments are very solidly soldered together; the incision between the 7th and 8th is obvious in the ♂, but the others (and this one in the ♀) are very obscure. With these exceptions the pupa agrees fairly well with the PYRALIS type. In all these respects it agrees also very nearly with the higher Obtect TINEINA, though most of them have, like the PYRALIDES, a maxillary palpus. The chief agreement is in the large head-piece and small prothorax, a feature that does not occur in any other Obtect group, and is in its extreme development in *Orneodes*. *Epermenia* is very near it also, but this is a remarkable pupa, leading from the Incomplete to the Obtect Tineids as a connecting link.

A paragraph on the relationship of this pupa to that of *Pterophorus* would be of the same kind as the celebrated chapter on the snakes in Ireland. There is no relationship between them. *Pterophorus* has not followed the line towards the Macros that has been taken by the PYRALIDES, but has struck out an entirely separate line of its own, and still retains nearly all the features of a Micro pupa. The only point that interests us here, in connection with *Orneodes*, is that the one Micro character which *Orneodes* has preserved and exaggerated (the large cephalic dorsal plate) happens, in *Pterophorus*, to have taken precisely the contrary direction. In *Pterophorus* it hardly exists, and is difficult to see; yet it does exist, and that so effectually that, as in nearly all Micros, it carries the eye-cover with it on dehiscence.

### ***Calamia lutosa*, its variation, habits, etc.**

By the Rev. C. R. N. BURROWS.

Encouraged by the theory that if you desire to capture a whale, your best plan is to angle with a sprat, I consented to fall in with the views of our energetic secretaries, and promised to fill in a gap in the season's programme by putting together a few notes about my experience of this species, although I imagine that some of my hearers probably know a great deal more about it than I do myself.

I have each autumn, since I first settled in Rainham, noticed a few specimens of *Calamia lutosa*—sometimes at sugar in my garden, sometimes at the station lamps, sometimes on shop windows in the village—these last, always on Fridays or Saturdays, when the windows are more brightly lighted, and the lamps kept burning later than on other days of the week.

It happened to be a species which I wanted badly, having only one or two ancient, worn and greasy examples, which had done duty for years, not only in my cabinet, but I believe in an older collection before. I was, therefore, somewhat exercised in my mind, and blamed myself when winter came round, for not having at least tried to find the head-quarters of the insect, and secured decent fresh specimens. It is true that I had tried to track it down in a feeble sort of way, and, being unsuccessful, I came to the conclusion that it was rare in my neighbourhood, and that the more or less worn and torn insects which had turned up were wanderers, who had lost their way, and came from some distant locality. But this year, having taken a single specimen at sugar in my garden, and having seen several flying about in a damp corner, where but a few reeds grow, in my upland hunting ground, I set myself seriously to find some more. The result of my search I wish to put before you to-night. First of all, however, I should like to relate all I know of the life-history of the insect, about which evidently little that is trustworthy has been recorded.

Newman, in *British Moths*, p. 272, writes: "The egg is laid in August, September and even occasionally as late as October, on the stems of the common reed (*Arundo phragmites*), and the young caterpillar very shortly emerges, and eats into the stem, descending towards the roots, on which it feeds below the surface of the ground." I found almost countless females laying busily on October 21st, and, as far as I saw, they were laying upon the *leaves*, and not upon the stems—but I may not have looked carefully enough. The eggs were laid exactly like those of *Apamea ophiogramma*—that is, in rows, generally single, sometimes double, in the folded edges of partly dead leaves towards the tip. Some 15 to 20 eggs seemed to be the general rule, and here comes a somewhat puzzling question. If the young larvæ proceed at hatching to enter the reed-stem, how have any, but the first-hatched, a chance of survival? One can imagine the race for a footing in the only available abode, and the question is, whether the tiny fresh-hatched larvæ, all seeing life first upon one leaf, are to be supposed to attack the one stem at the base of that leaf, or proceed to look out for a fresh and unoccupied plant. I must say that I think here, as also in the case of *A. ophiogramma*, that the young larvæ must be able to feed at first upon the leaves, and gather strength to travel before dispersing.

Next I find that in the *Entom. Record*, vol. iv., p. 52, Mr. Gardner writes of the habits of the insect:—"The following extract from my diary, dated July 21st, 1881, concerning *C. lutosa*, may interest some of your readers: 'discovered larvæ of this insect feeding in roots of *Arundo phragmites*. Should be looked for early in July to middle of August. The larva feeds very deep in the roots, but when about to change, leaves the plant and pupates in the soil, two or three inches from the surface. The presence of the larvæ may be readily detected by the bleached appearance of the plants which have been attacked; the pupæ, however, will be more easily found than the larvæ, for which I have dug as deeply as a foot, and then not reached the insect.' " This account, written by one who has undoubtedly a right to speak from observation of facts, differs from that of Newman, who, in highly-painted language, ascribes to the larvæ the habit of pupating

in the reed stem, and providing a water-tight door for exit and to keep out the flood water. Newman gives no authority for this statement, and there can be no doubt he copied it from some writer who knew as little about the subject as himself. I find that the period of flight of this insect is much longer than Newman tells us. He gives only August, whereas Merrin gives August, September and October, and Stainton, from the end of August to October. These dates I have found to be correct, for I have myself taken it from August 31st (1893) to October 21st (1895), and as the specimens taken on the latest date were many of them quite fresh, it was evident that they had only just emerged, the insect being one which is peculiarly liable to damage from flight. I did not have a chance of taking August specimens this year, not having discovered the habits of the perfect insect until late in the season, but I should imagine that it is as abundant then as later, if not more so.

I find that *C. lutosa* has various ways of spending the evening when, presumably, it alone interests itself in mundane affairs. Of 121 specimens, I have recorded the following particulars:—*One* was taken at ivy-blossom; *one* flying; *three* at light; *five* at sugar, and *one hundred and eleven* resting. I do not, of course, mean to suggest that *C. lutosa* does not fly much. Its time of flight is probably very short, but when it does fly it flies swiftly and vigorously. I will not bore you by details of my efforts to capture it on the wing—with a hat—and only remark that it has a habit of showing itself in flight when one has not got a net, and that I have never caught it in my hat. But what need to try to catch it flying, when you know the habits of the insect, and how easy it is to catch it napping? It was *then* I caught it. One evening in the early part of October, having either no leisure or no energy to go out myself, I persuaded an old friend to go after *C. lutosa* while I stayed at home. I told him all I thought and knew about its habits. "You will find it flying up and down, and in and out the reeds just at dusk, and later on it settles on the reeds, either alone or paired." Well, he went, and returned complaining that I had sent him on a wild-goose chase (I think he called it a "fool's errand.") Where had he been? To the reed beds, to which I had sent him. Of course I apologised, and tried to make him understand that I had set him to substantiate my theory that *C. lutosa* was a rare insect at Rainham. He laughed—a sorry laugh. I had to conciliate him, and to do this had to part with one of my worn-out specimens, and a promise to wire to him if I solved the mystery as to the head-quarters of *C. lutosa*. I did not give up the matter, but shortly afterwards I took the village schoolmaster, one or two of my most intimate friends, and half-a-dozen school boys, with nets and bull's-eyes, and down we went to the reed-beds. We searched most carefully outside and inside the luxuriant forests of reeds, for a half-mile or so, without success. Not a moth was to be seen—not a ghost of a moth—though every few minutes one or other called out, "I think I saw one flying." Yes! flying did not suit my purpose; I knew that all the fliers were worn to shreds. So we went on until, at last, worn ourselves, tired and disappointed, we turned back. Fortunately we left the reed-beds, and took a short cut, which led us alongside a poor little marsh ditch, where some reeds grew somewhat sadly. Doubtless their roots had

been grievously gnawed and mutilated by insect enemies, for there in numbers sat *C. lutosa*.

There were no pairs, which is curious, and very unlike the habits of Wainscots in general. I cannot believe that they had already paired and separated since their flight, for it was not late in the evening, and we were home again by 8.30 p.m. But, however that may be, there sat the moths, both sexes, silent and solitary, generally on the under-side of a drooping leaf, and sometimes upon a stem. Few moved when discovered, in fact as a rule they sat perfectly quiet, and dropped (shamming death) into the box placed beneath them; but we discovered this, that if the collector waved, delayed or moved the lamp, his chance was gone—down went *C. lutosa* into the tangled grass, whence it might perhaps be recovered torn and worthless. I saw a striking proof of this wide awakedness of the moth: one of my lads got somewhat tired, and walked ahead flashing the light from his lamp upon the reeds. I did not notice this, but remarked that all at once I ceased to find moths, and discovered that his light had disturbed them, and ere I reached the spot, down they went like lumps of lead into the grass. One other evening I had with them, this time the promised turn of my previously disappointed friend. We found numbers in the same way, and always where the reeds were most stunted, but curiously enough we found none on that part of the ditch which I had cleared a few days before. We took altogether some 108 specimens, some were too bad even to kill, certainly to set; but of the 91 which I have examined I find that the sexes are fairly balanced, consisting of 44 males and 47 females. I imagine from this fact that it was not really late for the insect, otherwise the females would have more distinctly outnumbered the males.

On looking over the specimens I could not fail to be struck with the accuracy of the collation of the forms of variation tabulated by Mr. Tutt in his *British Noctuae and their Varieties*. This is not only evidence of the care with which the book was compiled, but also of the similarity of the forms which I have found with those which he had come across. Mr. Tutt has kindly promised to bring his specimens for comparison this evening, and we have, therefore, the advantage of seeing specimens from different localities, and perhaps of detecting interesting differences. He will not, I am sure, object to my giving a short digest of his analysis of the species, which I have roughly condensed for my own use:—

- Type.—*C. lutosa*, Hb.—Pale-ochreous—whitish nervures. H.w. grey, dusky nervures. No spots or shades. ... (Rare).  
 ab. *pilicornis*, Haw.—Pale-ochreous—whitish nervures. F.w., a complete transverse row of spots. ... (Not rare).  
 ab. *crassicornis*, Haw.—Pale-ochreous—like above—plus strongly developed longitudinal fuscous shades.  
 ab. *rufescens*, Tutt.—Reddish-ochreous—without shades or spots. (Rare).  
 ab. *cannae*, St.—Reddish-ochreous—with transverse row of spots.  
 ab. *rufescens-suffusa*, Tutt.—Reddish-ochreous—with both spots and shades. ... (Not rare).

It will be noticed that the colour is the chief point of difference, and that of each colour there are three recorded forms. Of the 91 specimens which I have examined, and to which these notes refer, I find that the variation, arranged according to this table, is as follows:—



Form.	No Examd.	Males.	Females.	Form.	No Examd.	Males	Females.
<i>C. lutosa</i>	15	2	13	<i>ab. rufescens</i>	5	1	4
<i>ab. pilicornis</i>	28	13	15	<i>ab. cannae</i>	18	8	10
<i>ab. crassicornis</i>	20	16	4	<i>ab. rufescens-suffusa</i>	5	4	1

Mr. Tutt records the type form as "rare in England," whereas I record it here as bearing a fair proportion to the whole number. The fact is that I have tried to be strictly correct and honest, and have not thought it right to pick out the best specimens and describe them only. I have, therefore, sorted out the whole number, arranging them according to description, but I think you will agree with me that all but three or four of those ranged over the label *C. lutosa* are so worn and torn as to be worthless for identification as to variety. In fact, when fresh they may have been the type, but just as likely were one of the other pale forms; therefore Mr. Tutt, in having examined only fine specimens, is probably correct.

The species varies curiously in size, suggesting that sometimes the larva did not find enough food, or perhaps even that it had tried to get a living where another and more sturdy relation was settled before it; for I presume that over population may result in stunted specimens—even amongst moths. There seems to be also some variation in shape, some of the fore-wings being more sharply pointed than others, which appear quite blunt. I have not had leisure to go into this matter, but, roughly speaking, the difference is not sexual, as I fancied it might be.

I have brought to-night some extremely enlarged portraits of the insect, which, although not exactly what I hoped, will yet, I think, show plainly enough some of the curious variations of the marking.

Taking the type *C. lutosa* as being of a pale grey colour, with whitish nervures, we are able to trace clearly enough in the various forms the growth of the darkening influence of the black scales.

You will see in my box forms which can, I think, be fairly called spotless in both shades. The first step towards variation seems to be the development of the black dots upon light nervures in the position called by Stainton the elbowed line. These dots vary in number from 1 to 10 or 11—that is to say, there may be a black dot upon every nervure, and I have one specimen with this complete series of dots. Now, as a rule, the further darkening of the wing is brought about by what I may perhaps be allowed to call the concentration of the black scales upon the margins of the pale nervures, and I take it that it is this which when more fully developed produces the effect of dark longitudinal shades. These dark scales are very well shown in one of the enlarged photographs, especially in that of var. *rufescens-suffusa*, where the light nervures are distinctly framed in black scales, which, with the ochreous ground colour, produces a curiously tricolour-striped appearance over the whole fore-wing. But the most strange variation to my mind is the way in which these black scales sometimes appear to diverge from the nervures at the black spots, and, running at an angle from the nervures, meet one another in mid-area,

forming thus a curious zig-zag line with points directed towards the base of the wing. The effect is marked and suggestive. I know no other Wainscot (but of course my knowledge is limited) which indicates the same approach to the marking of the rest of the NOCTUIDS, unless it be *Tapinostola hellmanni*. I have tabulated the number of specimens examined which exhibit this development :—

(1). *ab. pilicornis*—4 males and 5 females. (2). *ab. crassicornis*—2 males and 2 females. (3). *ab. cannae*—1 male and 1 female.

That is, 15 out of 91 specimens. The numbers being so equally balanced between males and females proves that the mark is not sexual. In some specimens this mark is very indistinct indeed, so much so as to require a lens for its detection ; often the little black scales merely indicate by their positions an attempt to arrange themselves in abnormal lines.

I had thought that some point might be made of the unusually dark hind-wings of some of the specimens ; but it does not appear that they indicate anything in particular. As a matter of fact, I have picked out 5 males and 1 female from the 91 specimens with dark hind-wings, which seems to be quite contrary to the general rule. I have had some difficulty in arranging the specimens to my own satisfaction, dealing as I have done with so many poor and worn examples.

I have pointed out that the great majority of those arranged under the *C. lutosa* (type) label are quite unworthy of the distinction. Wear and tear reduce both the light and dark forms to the spotless, and it is quite necessary to examine specimens carefully before deciding what the markings are.

I fancy that Mr. Tutt might have added to his arrangement two other forms which I have come across, that is a form streaked, but not spotted, in both light and dark ; yet, at the same time, it is well to warn intending students of the species that the more worn a specimen, the more distinct streaks will it show in some lights, and that the streaks intended in the classification are those caused by the concentration of black scales, and not the shadows thrown by the folds or crinkles of the wasted wing.

A last word as to the distribution of *Calamia lutosa*. I feel perfectly certain that it is by no means a rarity. Observing that it is the more abundant the less promising the reed-growth appears, and that it may occur in great numbers where there are actually no well-grown plants at all, I infer that it is to be found, if looked for at the proper time, in most places. I am convinced, for instance, that it ought to be found throughout the course of the Lea and Roding wherever the food-plant occurs. I have seen it, to the number of three or four at a time, in a little damp corner far from running water, where a few reeds strive for a living beneath the shade of thick oak trees. I am sure that given a ditch and a few reeds, there the insect may be, and probably will be, found. But it wants looking for, for it is an insect with an unobtrusive habit ; it will not force itself upon our notice, and, until we go to its haunt to get it, we may not come across it at all.

Certainly, where one or two have turned up at light or sugar, there I should expect to find more, and the search ought neither to be long nor difficult, when one knows the sort of place in which to look.

## CURRENT NOTES.

Mr. Newstead describes (*F.M.M.*, March) a new Coccid from Snettisham Beach (near K. Lynn) and Llandudno, and names it *Lecanopsis brevicornis*. It is easily recognised by its very short, 7-jointed antennæ, short legs, large spiracles, and by the ♀ covering her body at gestation with a glassy test. He also adds (1) *Chionaspis aspidistræ*, Sign., discovered in a greenhouse near Chester on *Asplenium*, and (2) *Icerya aegyptiaca*, found on *Aristolochia saccata* (imported from Calcutta), in the Royal Gardens, Kew, to the British list. The male of *Ripersia fraxini* is also described for the first time.

Mr. E. R. Banks records that *Asychna aeratella*, bred from larvæ in galls on the stems of *Polygonum aviculare*, found on the downs near Shoreham, Sussex, emerged freely in 1895, after having remained two years in the larval state.

Mr. L. B. Prout calls attention (*Entom.*, February) to the confusion which exists in the application of the names *fuciformis* and *bombylifomis* to our bee-hawks. Following Zeller, he concludes that (1) "*Fuciformis*, Linn. = *fuciformis*, South's List = *bombylifomis*, Auct. Brit. = the narrow-bordered or scabious species. (2) *Bombylifomis*, Ochs. = *bombylifomis*, South's List = *fuciformis*, Auct. Brit. = the broad-bordered or honeysuckle species." Mr. Kirby points out that in his *Catalogue* he has accepted the "honeysuckle" species as *fuciformis*, Linn., chiefly on account of Linne's citations; thus reversing Zeller's decision. The name *bombylifomis* is shown to be untenable, and the two species work off thus:—(1) *Fuciformis*, Linn. (broad) = *bombylifomis*, Ochs., South's List. (2) *Tityus*, Linn., S.N., ed. x., p. 498 (narrow) = *fuciformis*, Ochs., South's List = *bombylifomis*, Esp., Dbld., Newman, &c.

Although we have Buckler and Hellins' *Larvæ of British Butterflies and Moths* still in hand, we are asked by Messrs. W. A. Rollason and H. Foster Newey to state that they are preparing a work upon the larvæ and pupæ of British Lepidoptera. Probably the drawings are meant to supplement those which are missing from the above work, and the descriptions are intended to give us the many essential details that Buckler and Hellins have overlooked. We want much information on the moults, changes and modifications of tubercles, the sub-segments and other details of larval structure, also on the anal armature, mode of dehiscence, etc., of pupæ. If our assumption that this is intended be correct, there is no doubt that the work will be a useful addition to our libraries; but if the describer and artist are about to describe and depict the larvæ which other authors and artists have already described and depicted, we are at a loss to know what good purpose the work will serve.

It is amusing to find that someone has at last taken Mr. Arkle seriously. Mr. G. A. K. Marshall, writing from Mashonaland, discusses the remarkable notes that Mr. Arkle wrote on the "Senses of Insects" (*Entom.*, xxviii., 30 and 243) in the most serious vein, and of course slates him most unmercifully. Mr. Marshall's own remarks on the hearing of the Cicadas and Termites are exceedingly good, and show him to be an intelligent observer.

Professor Smith states that the generic name *Noctua* was used by Klein in Mollusca, 1761 (or 1753); by Fabricius in Lepidoptera in 1776;

by Savigny in Birds in 1809; whilst *Noctuae* (plural form) was used by Linné in Lepidoptera in 1758. Since Klein's date is before 1758 (the date fixed for the operation of Zoological nomenclature), it falls, leaving *Noctua* free for Lepidoptera.

Dr. Dyar (*Psyche*, February, 1896), has bred the English form of *Notolophus* (*Orgyia*) *antiqua*, and states that the larvæ and imagines are identical with those of the New York species, *N. nova*, and that the Californian *N. badia*, formerly separated from *N. nova* by the absence of the larval side tufts of hairs, is also identical with *N. antiqua*, the side-tufts simply developing at a later age, or not at all. He further states that the larvæ of all the members of the genus exhibit four stages (3 moults) for the male and five (4 moults) for the female. Dr. Dyar considers the larval side-tufts a lately acquired character, and therefore makes *badia* the more generalised form of *antiqua*. He is upheld in his belief that *badia* is only a local form of *N. antiqua*, because of "their ready fertility with normal *antiqua*."

In an interesting paper, by Dr. Harrison G. Dyar, on "The Bombyces: what were they?" he concludes:—"The Bombyces consisted of the higher types in all lines of development, regardless of relationship. If we imagine the genealogical tree of Lepidoptera as growing upright from the ground, the several branches and twigs representing the families, and being of length proportional to their degree of specialisation, the old classification would be represented by horizontal planes. The uppermost would cut off the very summit of the tree, the PAPILIONIDES; the next would take the next succeeding branches, perhaps the SPHINGIDES, and the tip of a side branch from the Tineid stem, say the *Sesiidae*. The next cut might give the old *Zygaenidae*, consisting of some families from the Agrotid and Tineid trunks, and the fourth cut is our Bombyces taking branches of all the trunks that are approximately equal in degree of specialisation. The base of the tree would comprise the rest of our old familiar families, the *Noctuidae*, *Micros*, &c."

## PRACTICAL HINTS.

**PAINTING CABINET DRAWERS.**—Will some one with experience kindly say what is the best preparation for painting cabinet drawers? I have been using, for some years, a recipe consisting of 3 grains of corrosive sublimate dissolved in spirits of wine, 1 oz. of whitest gum arabic, 2 oz. bottle of 2 parts water and 1 carbolic acid and prepared chalk, but do not quite like it. I see in *Entom.*, xxviii., p. 388, corrosive sublimate in alcohol is recommended. Is this any better, and why? E. F. STUDD, M.A., B.C.L. *February, 1896.*

**DATA WANTED.**—In connection with reports on collecting, etc., very few correspondents add remarks on the weather, etc.; would not these reports be of greater value for comparing different places, if made in some such form as the following extract:—"BRACKLEY, August, 1891. —The first three weeks were fine and warm, the last week had the greatest fall of rain this year; during the first three weeks the following species were taken, &c., &c." Whilst speaking of this subject, I should be very glad of information as to collecting in 1890-1-2-3-4-5, whether good, bad or indifferent, from collectors in any part of England, Scotland and Ireland.—AMBROSE QUAIL, 167, Brooke Road, Clapton, N.E.

## SCIENTIFIC NOTES AND OBSERVATIONS.

ASSEMBLING IN BOARMIA ROBORARIA.—I have lately looked up the various references to "assembling" in the magazines, but find no particular reference to the habit in *B. roboraria*. It may, therefore, be worth recording that, while in the New Forest during June, 1895, with my friend, Mr. T. Clarke, we found a freshly emerged female of this insect. The plumose antennæ of the male suggested to us the idea of "assembling," and we therefore tried it, and were most successful. The males put in an appearance at about 12 p.m., and in two nights we took at least forty, which were not, I suppose, one half of the number we actually saw.—J. S. BELL, 150, Stockwell Park Road, Brixton.

## NOTES ON COLLECTING, Etc.

EARLY SPRING NOTES.—ABERDEEN.—*Phigalia pedaria* has again made an early appearance here. I found two males in the Logie Woods, near Pitcaple, on January 22nd, and a female on a telegraph pole, near Monymusk Station, on the following day. Mr. Reid told me that he first noticed *P. pedaria* on (I believe) January 16th.—A. HORNE, Aberdeen. February, 1896.

EMSWORTH.—I noticed *Hybernia leucophaearia* for the first time on January 26th, on which date *Cheimatobia brumata* was still out.—W. M. CHRISTY, F.E.S., Watergate, Emsworth. February, 1896.

DONCASTER.—The mild season is bringing out insects very early here. On January 12th I saw *Hybernia defoliaria* and *Cheimatobia brumata*; on January 19th, *Phigalia pedaria*; on February 16th, *Nyssia hispidaria*; on February 20th, *Anisopteryx aescularia* and *H. leucophaearia*. The latter species (*H. leucophaearia*) is extraordinarily scarce here this year. As a rule they are very abundant, but this season I have as yet only seen five. *P. pedaria* also is far from common. On the contrary, *N. hispidaria* is more abundant than usual; I took six yesterday between 4 p.m. and 5 p.m. Some of these were drying their wings, and all were on the lower part of the trunks of oaks. On the 16th inst., I found one on a small branch of a sycamore.—H. H. CORBETT, M.R.C.S., Doncaster. February 25th, 1896.

VANESSA URTICÆ AFTER HYBERNATION.—One of my boys, on his way home from Blackheath Road School, captured a specimen of *V. urticae* yesterday. It seems extraordinarily early even for this species.—J. E. EVANS, Greenwich. February 13th, 1896.

I picked up a living specimen of *V. urticae* in my house yesterday, and another on a path in the Old Kent Road to-day.—(Mrs.) E. MACMILLAN, Avondale Square, S.E. February 12th, 1896.

I observed a specimen of *V. urticae* near Halstow Road Board Schools (E. Greenwich), to-day.—C. NEWBERY, Annandale Road, Greenwich, S.E. January 31st, 1896.

CUCULLIA GNAPHALII.—I took a larva of this species on August 24th, 1894, in the Sevenoaks district. The larva pupated on August 27th, and emerged on June 23rd, 1895.—EDWARD GOODWIN, Canon Court, Watlington. February 14th, 1896.

UNUSUAL APPEARANCES OF DASYCHIRA FUDIBUNDA.—I have bred

imagines from the dark form of larva of this species. These emerged on November 21st, 1895, January 9th and 19th, and February 1st, 1896, the larvæ having pupated towards the end of September, 1895.—C. W. WILLIAMS, Penarth. February 10th, 1896.

### The Sallow's Dream.

By CLAUDE MORLEY, F.E.S.

The night is pitchy; pitchy in the entomologist's sense of the word—black with the least possible suspicion of brownness overspreading the heavens where the storm-clouds lower threateningly. By day the country around is fair to the eye of the beholder. Two men, laden with lanterns and nets, their pockets jingling to the time of their footsteps, reveal the presence of those ever-useful accessories of the insect hunter—glass-bottomed pill-boxes. With quick and lithesome tread they take their way a-down the sandy lane. To the right stretch fields interminable, ploughed and rolled, the young corn just making its first acquaintance with the early spring night. On the left a marsh winds away between wooded banks, on this side—oak, on that—pine. Before them, not a quarter of a mile ahead, is their destination, a great wood, which for many a long year has been their Elysium. Here they have chased *Limenitis sibylla* through the summer sunshine, boxed *Longicornia* from the fragrant *Umbelliferae*, and many a sleepy *Dipteron*, basking in the genial warmth on some stalwart trunk, has fallen a victim in the cause of Science. The taller, a man of perhaps some forty summers, hugs beneath his arm a bundle—what, a sheet? but why in so lone a spot, and at such an hour? 'Tis well no city urchin is around! On, on they tramp, until at last the wood is reached. Ah! how brightly do the sallows of the sterner sex shine out “amid the encircling gloom,” and the air is filled with so sweet a scent, that even through the “navy cut” it penetrates to their nostrils, and swells their hearts with simple Arcadian thoughts of *Xylina fuscifera*. The sheet is spread with care and much pulling of brambles beneath the greatest of these golden bushes, and then away with pipes to pockets, matches are applied to the lanterns—the search commences. *Anticlea nigrofasciaria* flits away with obvious disinclination to leave so grand a feast, but hesitation costs him dear, and soon he feels the soft retaining folds of the leno. The three *Hybernidae* seem to recollect previous engagements, but are detained, and ere long *Hybernia leucophaea*, *H. marginaria* and *Anisopteryx aescularia* find willow walls around them. The lanterns trimmed, the blossoms, each laden with its fragrant pollen, are scanned by eyes long trained to search out *Homalotæ* and *Limosinæ*. *Taeniocampæ* swarm—*incerta*, *pulverulenta*, *stabilis*, *gothica*—what is this? Ah! *populeti*—no, *incerta* var.! Further, *leucographa*—yes! but surely never taken here before? well, this is a locality long neglected—*leucographa*, yes, and in plenty; what a fine and varied series! Look at that beauty; what can it be—*rubiginea*? Yes, *Dasycompa rubiginea*! “I have one!” “And I've a second!” Worn *Xylina ornithopus* and *Orrhodia ligula*, *Scopelosoma satellitia*, *Calocampa exoleta*, and a nice lot of *Hoporina croceago*. The sheet below is getting damp and cold this early spring night. Suddenly it is covered with a multitude of dead things, which, a moment later, animated as with one instinct, crawl and run—Lepi-

doptera, Diptera, Coleoptera. "See! there's *Orrhodia erythrocephala*, I am sure it is, but I can't box it; it is covered by *Ervirhinus maculatus*, as is *Geotrupes* by its parasites—Ah! 'tis gone, lost to Science, eaten by a horde that runs with majestic gait!" Spiders, centipedes and earwigs crawl and hop and jump and swing, one great mass, one struggling crowd of the lower *Tracheata*. "The sheet is rising! Oh! the slugs and earwigs, the woodlice, centipedes and springtails! Help, help, help, they sting and crawl and bite!"

The linoleum was cold, and the bed had to be carefully re-made before it was again habitable.

## NOTES ON LIFE-HISTORIES, LARVÆ, &c.

LIFE-HISTORY OF *COCCYX COSMOPHORANA*.—I have had considerable experience in breeding this species, having found larvæ in Argyleshire, Perthshire, Inverness and Morayshire. I have obtained larvæ feeding in various ways, and they do not seem to be at all particular as to the method adopted. I have, for instance, bred them from the excrescences of *Retinia resinana* freely, from those of *Phycis abietella*, from galls, from small excrescences on young firs, and from resinous exudations on old fir trunks. This species may also be bred from native fir cones, feeding only where *P. abietella* has been domiciled. I can always obtain both larvæ and pupæ of this species.—W. SALVAGE, 12, Montreal Road, Brighton. February 17th, 1896.

HABITS OF LITTLE-KNOWN SPECIES.—The larva of *Coccya nemorivagana* mines the leaves of *Arctostaphylos uva-ursi*. The larva of *S. coniferana* feeds in the resinous matter from young and old Scotch firs, whilst I have found those of *P. abietella* in old fir-cones, galls and dead wood.—IBID.

THE HABIT OF LARVÆ OF *BOARMIA ROBORARIA* IN SPRING, IN NATURE: A QUERY.—In the last *Ent. Record*, p. 245, Mr. Tutt has given an interesting note about the feeding of the hibernated larva of *Boarmia roboraria*. I should like to ask, Does he consider it a natural habit, or is it an experience from breeding only? Do the New Forest collectors, for instance, take the larva in March before the oak buds are opening, and have they found it eating the bark? The only note on the subject I am able to lay hands on at present is one by Mr. Tutt (*Ent. Record*, vol. iv., p. 158): "I sleeved them (autumnal larvæ of *B. roboraria*, bred from ova) on birch, and they were awake long before the birch was out, but they ate the bark and got fat on it." Can we rightly judge of natural habits from breeding under what must always be somewhat artificial conditions? The protection of a sleeve and its environment, generally a garden with buildings about it, keep the larva warmer; it is unable to follow its predilections as to suitable hibernating quarters, and has to put up with the limitations of the sleeve; may it not therefore probably be more easily roused in response to the stimulus of heat? If so, finding the buds not ready, may it not be driven to eat the bark to avoid starvation? When breeding insects, and I have forgotten to supply them with food, I have occasionally noticed the outer coverings of the stem or bark nibbled.—W. S. RIDING, M.D., F.E.S., Buckereil. March 3rd, 1896.

I know nothing of the species beyond the facts to which Dr. Ridg. refers above. It may be as he suggests, that in a state of nature the larvæ of *B. roboraria* do wait until the leaves are out. My observations lead me to feel that I should be surprised if I learned that they really did so. Perhaps Mr. Hewett can tell us?—J. W. TUTT. March 5th, 1896.

## VARIATION.

COLOUR DIMORPHISM IN *XANTHIA FULVAGO* (CERAGO).—The rarity of the orange-tinted specimens of this species appears to be most marked in all districts whence data have been received. In some localities it would appear they hardly occur at all. Thus of 38 specimens captured at Montrose and examined by Dr. Gunning, 30 were of the typical form (pale lemon with red markings) = *fulvago*, Linn.; 2 were of the ab. *suffusa*, Tutt; and 6 of the ab. *flavescens*, Esp. Not a single specimen of the deeper tinted colour occurred. Of 46 specimens captured at Morpeth, and examined by Mr. Finlay, 26 were of the typical form, *fulvago*, Linn.; 16 were of the ab. *suffusa*, Tutt; and 3 of the ab. *flavescens*, Esp.; whilst only one of the deeper tinted form, ab. *aurantia*, occurred. Of 31 specimens bred from larvæ taken at Oxshott, and examined by Mr. Page, 14 were of the typical form, *fulvago*, Linn.; 12 were of the ab. *suffusa*, Tutt; whilst 4 were of the ab. *aurantia*, Tutt. Of 12 specimens from the New Forest, examined by Mr. Moberly, 2 were typical *fulvago*, Linn.; 4 were ab. *suffusa*, Tutt; 4 were ab. *aurantia*, Tutt; and 2 ab. *virgata*, Tutt. Mr. Moberly adds:—"The ordinary form in the New Forest, so far as my experience goes, is the orange form with red markings. Occasionally we get the orange form with purple markings, and more frequently the paler form with red markings." Mr. Beadle says:—"X. *fulvago* is a very common and variable species here; but until last year I never found the ab. *flavescens* in any numbers. At Kendal the species did not vary much, being lemon yellow with very distinct dark markings."—J. W. TUTT. February 29th, 1896.

VARIATION OF *HYBERNIA LEUCOPHÆARIA*.—We get in Epping Forest both the forms of *H. leucophaearia* figured on the plate in last number (see *Record* iii., p. 115, vol. iv., p. 80).—AMBROSE QUAIL, 167, Brook Road, N.

## SOCIETIES.

THE ENTOMOLOGICAL SOCIETY OF LONDON held a meeting on February 19th, 1896. Dr. D. Sharp exhibited preparations of *Dytiscus latissimus* and *Cybister roeselii*, to show the so-called secondary wing, noticed by Meinert. He stated that this structure is only a part of the elytron, to which it is extensively attached, and that he considered that it corresponded with the angle at the base of the wing seen in so many insects that fold their front wing against the body. He could not consider that this structure afforded any support to the view that the elytra of beetles correspond with the tegulæ of Hymenoptera rather than with the front wings. He also exhibited specimens of Neuroptera, and pointed out that this secondary wing agreed in position



and structure with a small lobe on the front wing of *Raphidia*. Mr. C. G. Barrett exhibited, for Dr. H. G. Knaggs, cells of *Retinia resinana*, formed of resin but lined with wax. A portion of the cell had been removed and the resin dissolved away with spirit, leaving a slight film of wax (*cf. Ent. Mo. Mag.*, Nov., 1895, pp. 251, 252). Mr. Tutt stated that a secretion of wax had been detected by Dr. Chapman on the external surface of the pupa of *Parnassius apollo*. Prof. Meldola suggested that as Dr. Knaggs had shown how to separate the resin from the wax, it would be of interest to make a chemical investigation of the latter, since a sufficient supply of this material could easily be obtained. No insect wax, with the exception of that of the bee, had been submitted to investigation by chemists. Mr. Gahan exhibited drawings of the dorsal segments of the abdomen of *Dyscritina longisetosa*, formerly described by Prof. Westwood in *Trans. Ent. Soc.*, 1881, a specimen of which was shown by Mr. E. E. Green at the last meeting of the Society. He regretted that no drawing, showing the ventral surface, had yet been prepared. Mr. B. A. Bower exhibited specimens of *Argyresthia atmoriella*, taken in Kent, in June, 1894, a recent addition to British Lepidoptera. Mr. E. E. Green read notes on the habits of the Indian ant, *Ecophylla smaragdina*, Fabr. He said he believed that at some previous meeting of the Society, Mr. Ridley, of the Singapore Museum, made some remarks on this ant, and its supposed habit of using its own larvæ as web-spinners in the formation of its nest, but he had not been able to find anything on the subject in the *Proceedings*. Mr. Green stated that he was now able to produce corroborative evidence from an independent source. The facts were noted by his friend, Mr. W. D. Holland, of Balangoda, Ceylon, a most careful observer. Mr. Green exhibited the specimens referred to by Mr. Holland, and pointed out that the larvæ were still tightly grasped by the jaws of the ants, and he thought it probable that other web-spinning ants utilised their larvæ in the same way. Mr. Hampson said he could confirm this statement. Mr. G. F. Scott-Elliot read a paper entitled "Notes on Flower-haunting Diptera." The author pointed out that some of the higher types of Diptera appeared to prefer red and blue flowers, and oftener visited the complicated types of plants than the smaller Hymenoptera. He also alluded to the effect of insect visitors in isolating particular individuals. Prof. Meldola expressed himself much interested in the paper, and stated that although he was aware, from the writings of Herman Müller and others, that Diptera played an important part in the fertilization of flowers, he was unaware of the very great importance which these insects possessed for the function of pollination until he heard Mr. Scott-Elliot's paper. He also called attention to the urgent need of a manual of British Diptera. Mr. Roland Trimen mentioned that in South Africa some species of Orchidaceæ were fertilized by Diptera. Dr. Sharp said Prof. Plateau thought that neither the colour nor form of the flower played any part in attracting insects. Mr. McLachlan remarked that the flowers of *Scrophularia* possessed a great attraction for wasps. Lord Walsingham enquired whether any observation had been made as to the Diptera which visited differently coloured flowers of the same species, such as *Petunias*.

THE SOUTH LONDON ENTOMOLOGICAL SOCIETY met on February 18th,

when Mr. McArthur exhibited a very long series of *Tryphaena comes*, from Hoy, all of them being intermediate between the type and var. *curtisii*, and without black suffusion of hind-wings; also a number of extinct, rare and unique species and specimens of Lepidoptera, including a series of *Chrysophanus dispar*, a pair of *Lasiocampa ilicifolia*, two completely banded and one with yellow ground; *Abraxa grossulariata*; two Killarney specimens of *Notodonta bicolor*; the original specimen of *Nyssia lapponaria*; two *Syntia musculosa*; a specimen of *Hadena peregrina*, from Lewes; three *Caradrina ambigua*; one *Xylina lambda* var. *zinckenii*; three *Ophiodes lunaris*, one of which is a beautifully banded var.; the unique *Catocala electa*, taken by Mr. Vine; one *C. fraxini*; and a series of *Eupoecilia gilvicomana*. Mr. R. Adkin: a specimen of *Cucullin gnaphalii*, bred by the late Mr. Tugwell. Mr. Sturt: specimens of *SPHINX CONVULVULI*, BRED FROM CORNISH LARVÆ. Mr. Tutt remarked that Mr. Sturt deserved great credit for getting *Sphinx convolvuli* through, and he was, he believed, the first British lepidopterist who had bred the insect from the larva to the imago. Prof. Poulton got the larva through to the pupal stage, although since that time there had been more than one suggestion in the magazines that *S. convolvuli* might hibernates in the imaginal stage. Mr. Oldham exhibited *Cosmia affinis* from Epping Forest. Mr. Frohawk: the contents of a pheasant's crop, consisting mainly of the larvæ of the Dipteron, *Bibo marci*. Mr. Moore: an *Ichneumon*, with an extremely long ovipositor, from the Upper Amazon. Mr. Auld, a bred series of *Tortrix crataegana*, from the New Forest. The pupæ were found spun up in leaves of buckthorn under oaks. Mr. Carpenter: a very large number of *Argynnis paphia* and its vars. Mr. South: a number of *Argynnidae* from the Palæ-arctic region, and read a paper on "THE GENUS ARGYNNIS, WITH PARTICULAR REFERENCE TO VARIETIES HAVING PALE AREAS." In the course of his remarks, Mr. South pointed out that in many specimens the pallid spots were constant in position, and considered that Mr. Frohawk's suggestion, that they were ancestral markings, was probably the correct explanation of these pallid areas. Mr. Barrett doubted this, and considered that it was more probably due to a diseased condition of the larva or pupa. Mr. Robinson asked what was the condition of the scales on these patches, as they appeared to him to be more or less transparent or absent. Mr. Frohawk stated that he had examined the scales under a microscope, and had found that they were present, but were without the ordinary pigment. Mr. Tutt then remarked that this statement practically gave away the whole theory propounded by Mr. South (and first suggested to him by Mr. Frohawk), viz., that the marks were simply ancestral characters; for the allied species which had been mentioned, and in which pale marks appeared towards the costa, as pointed out by Mr. South, and which he considered were parallel to the pale patches exhibited by the male *A. paphia*, to which the discussion referred, had these pale patches fully pigmented. He further considered that the irregularity in size and shape, the variation in position, and the fact that the peculiarity was sometimes extended to a whole, or to a large portion of a wing, militated against the idea; whilst to say that the patches were reversion to ancestral characters was no explanation

of the actual cause of the patches, which was evidently what one wished to arrive at. For every effect there was a cause, and the question was, what causes certain portions of the wing of certain Argynnids to develop these abnormal pale patches? Mr. Frohawk's statement that there was no pigment in the scales on these patches made the matter a purely physiological one, for it showed that the ordinary material—pigment-factor, as Dr. Ridg termed it—had never been deposited in the scales. What caused the failure of this deposit? is the next question. It could not be that at some previous stage the ancestral form had had no pigment in the scales in certain portions of the wings, nor did Mr. South suggest this; but, in the cases which Mr. South relied upon—the pale patches in var. *valesina* and other species—the scales forming these pale patches were thoroughly pigmented, the mature pigment-factor only producing a paler colour than the normal fulvous colour of the males of such Fritillaries as *A. paphia*. Mr. Tutt considered that these pale patches were analogous with similar pale patches in the Satyrids, which also were often symmetrically, often very unsymmetrically, placed on the wings. He referred to the recent researches of Schäffer and others, that the scales in the course of development went through the following stages:—(1) transparent, (2) white, (3) yellow (owing to the deposit of pigment-factor from the pupal blood), (4) ordinary colour of matured pigment. It would appear, then, that in these pale patches, either (1) the pigment-factor has not been deposited, or (2) if deposited, had never got beyond stage 3, (yellow) in its development. If these arguments were logical, then we had now to consider what is the most likely explanation of this retarded scale-development. Taking into account the known facts of the histolysis of the pupal tissues, Mr. Tutt considered that anything that would cause a local weakening of the tissue would produce a result similar to that exhibited. This actual weakness of tissue might occur in the larval period, when it would naturally be carried through the pupal stage, or it might originate in the pupal stage; whilst the possible factors that might cause local weakness or disease in a larva or pupa are manifold. He further pointed out that a well-known lepidopterist had observed that when dust particles or other foreign matter interfered with the pupa when it was in a very soft stage, *i.e.*, during the first hour or two following the change from the larval to the pupal condition, the result always ended in crippling the imago or in the failure of complete scale development in the neighbourhood of the injury or irritation. Mr. Tutt supported Mr. South very strongly in his suggestion that the time must now soon come when the butterflies of this country will have to be placed in their proper genera, and further agreed that we had at least three Argynnid genera among our species, *viz.*, (1) *Dryas—paphia*; (2) *Brenthis—euphrosyne* and *selenis*; (3) *Argynnis—adippe*, *aglaia* (and, doubtfully, *lathonia*).—February 27th.—Mr. R. Adkin exhibited specimens of *Hybernia leucophaearia*, Schiff., from Abbott's Wood. The pale and dark-bordered were found in equal proportions, only one black specimen was taken. Mr. Short: a bred series of *Acronycta myricae*, with a Dipterous, and a series of a Hymenopterous, parasite from its larva. Mr. Billups recognised the latter as *Ichneumon fuscipes*. Mr. Dennis: two living females of *Vespa germanica*, taken in February. Mr.

Perks: two living specimens of *Rhagium inquisitor*, L., from Epping Forest. Mr. McArthur communicated notes ON THE OCCURRENCE AND LIFE-HISTORY OF COCCYX COSMOPHORANA, AND RETINIA RESINELLA. He said that the former was always more or less common at Rannoch, where the latter was unknown. As far as he had observed, the larvæ of the former did not, in Scotland, feed in the way described by Kaltenbach. He was convinced that the larvæ did not normally feed on the refuse of *R. resinella*, but that it did so at Forres he was perfectly certain.

THE CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY met on February 18th, 1896.—Exhibits:—Mr. May: Part of a series of *Peridroma saucia*, bred from Sandown ova, between November 22nd and December 12th, 1895. The larvæ were fed on cabbage, marigold, and slices of carrot and potato, and the moths emerged either at dusk or about 11 p.m., the expansion of the wings being very rapid after it had once begun. One of the specimens was abnormally straight along the costa, and the tips of the fore-wings were unusually pointed. Mr. Bacot exhibited a long series of this species, and read the following NOTES ON BREEDING AGROTIS (PERIDROMA) SAUCIA:—"I exhibit 147 specimens out of 250 examples bred. The ova were laid by a dark red female, captured at Sandown last August. Although there is considerable variation in minor details and shades of colour, the brood as a whole follows the ♀ parent closely, and the specimens, with one or two exceptions, would not be called variable if compared with a captured series. A few pale grey forms emerged, one of which is almost as light as *Acronycta aceris*. The ♀s lay an immense quantity of eggs; I estimated the number at from 1500 to 2000. The larvæ are very hardy, and easily forced if kept in a warm room. Very few, if any, of mine died, and they will eat almost anything, either leaves or roots, carrot, turnip, potato, or cabbage-stalk being eagerly devoured." Mr. J. A. Clark: living bred females of *Phigalia pedaria* and *Nyssia hispidaria*. The Secretary read the following note from Mr. J. B. Rosevear:—"VANESSA URTICÆ AT THE WATCH-NIGHT SERVICE."—"One of the midnight worshippers at the watch-night service in Melham Congregational Church, on December 31st, 1895, was the well-known *Vanessa urticae*. For some time I observed this beautiful creature flitting from pew to pew, and it was with considerable difficulty I could content myself with sitting still. A strong desire to rush out and capture it was only kept in check by the knowledge that I was in the House of God, and that if I had done so the congregation would think I was a fit subject for Colney Hatch. However, I watched it, and presently the strong gas lights attracted it towards them, and it at last rushed madly at them, and fell a victim to their burning influence. It fell wounded and dying to the ground, and eventually was secured by me. It is a fully developed specimen, but, of course, minus antennæ, legs, and portions of its wings. I think it worthy of a place in my cabinet, notwithstanding." Messrs. J. A. Clark and Tutt referred to other instances of the occurrence of this species in London during the present winter. Mr. C. Nicholson read a paper on "The Planet Mars."

## REVIEWS AND NOTICES OF BOOKS.

BY TANGLED PATHS.—By H. Mead Briggs [203 pp. Published by Fredk. Warne & Co. Price 3/6].—Nothing is more pleasing to scientific

specialists than to read a book in which the beauties of nature are described in choice language, and without incorrect statements and impossible observations being forced upon them on every page. Yet so few writers have the requisite knowledge and power of expression to produce such a book, that the strictly scientific man religiously eschews everything in this direction, until, by rare good chance, he finds an author who combines the requisite knowledge with a good command of the English language, and, once a successful author of this description is found, those who know the value of writing which they can, more than any others, appreciate, are fain to read all that such an author can present to them. It was with these preconceived ideas that we opened the above book, and, on the whole, we must say we are well satisfied at the result of our temerity. In the main, the various chapters are well written, the information is accurate, and some of the ornithological notes really good. We can, therefore, recommend this as an addition to the row of volumes which every scientific naturalist should keep on his book-shelves, and to which he can turn when he wishes for a quiet hour after having put aside the labours of the day. The chapter on "Idleness" is, however, weak though-out, and such remarks as are to be found on pp. 56-57 are altogether out of place. We have before stated, and repeat again, that when theology and science are mixed up it is bad both for the science and theology. Repetitions also are much too frequent. One gets an excellent chapter—"A Chorister"—on the nightingale, but when the same remarks are repeated again on pp. 103-106, and yet again on pp. 121-122, the good thing becomes wearisome; so also with the oft-repeated remarks on the kestrel, halcyon and other birds. But such a book the author will naturally tell us was not written to be read straight off—a chapter in an easy chair, to be repeated not oftener than once a day—would probably be his prescription, and the book was evidently conceived in order that it should be taken this way, and is excellently suited for the purpose.

THE HONEY BEE.—By Frank Benton, M.S.—[118 pp., 11 plates and 76 woodcuts.—Washington Government Printing Office].—This is a manual of instruction in apiculture, and an excellent manual too. It should be read by all those interested in bees and bee-keeping. Being a Government publication, it may, we believe, be obtained by all interested societies and individuals on application. The chapter on "Bee Pasturage" is especially interesting, and the plates illustrating the plants referred to are excellent.

### A Stepping Stone from the Old Entomology to the New.\*

Nothing has been so much wanted by entomologists generally as a book which should distinctly and clearly set forth the connection between the old entomology and the new, and we have to congratulate Messrs. Routledge on the publication of one. The book that Mr. Tutt has written for them is intended to replace the Rev. J. G. Wood's *Common British Moths*, but what that author would think of the new work we can hardly venture to surmise. Instead of the old inaccurate scissors-and-paste friend of our youth, we have a book written *de novo* by one who knows practically every branch of the study he professes.

\* *BRITISH MOTHS*, by J. W. Tutt, F.E.S. [368pp., 12 coloured plates, and 61 woodcuts. Published by G. Routledge & Sons, Ltd., Ludgate Hill, E.C. Price 5s.]

The result is obvious. The classification is based on the correlation of the schemes suggested by Chapman, Comstock, Dyar, Hampson and Packard, and hence of the 22 chapters we get 19 as follows:—"Sphingides," "Saturniides," "Bombycides," "Chelonides," "Drepanulides," "Pseudo-Bombycides," "Noctuides," "The Geometriform Noctuides," "Geometrides," "Deltoides," "Other families of the Obectæ," "The Incompletæ," "Pterophorides," "Hepialides," "Zeuserides," "Tineides," "Cochliopodides," "Zygænides," "Proto-Lepidoptera or Erioccephalides." It will be seen by this arrangement that all the Families are dealt with, but whilst all the species of the old MACRO-LEPIDOPTERA and the DELTOIDES are dealt with at length, those of the old MICRO-LEPIDOPTERA occupy much less space, although their positions and relationships are clearly indicated. The other chapters not enumerated above are "The Study of Entomology," "Moths or Heterocera," "Apparatus, Pinning and Setting Insects, Killing Insects, Rearing Insects." The summaries at the end of each section are quite a new and interesting feature, and it is doubtful whether the book will be more warmly welcomed by the collector or the scientific lepidopterist. That part of Chapter xi. dealing with the "Pugs" is really one continuous series of "Practical Hints," telling the collector where and how to get them, and leading him to readily distinguish the species rather by their localities and habits than by wordy descriptions. Some of the most striking alterations from the old scheme are—the bringing up of *Endromis* and *Saturnia* near the SPHINGIDES; the separation of the CHELONIDES from the BOMBYCIDES proper; the separation of the Wainscot moths into two distinct Sub-families, the Leucanids going with the *Noctuinae*, the Nonagriids with the *Apameinae*; the addition of the *Stilbidi* (including *Chortodes*) to the *Caradrininae*, and the combination of the species in the *Apameidi* and *Hadenidi* into the same sub-family. The Bryophilas come very near to the Dianthæcias and Hadenas proper, and no one will be surprised to see the species of *Mamestra* and *Hadena* closely united. Among the GEOMETRIDES many new combinations occur, some of which appear to be natural enough, others evidently are more doubtful in their relationships. The author owns his utter inability to suggest the relationship of *Anisopteryx aescularia*. Perhaps the enumeration of the families and sub-families in the GEOMETRIDES will give the best idea of the order followed:—I. GEOMETRIDÆ (*Macariinae*, *Rumiinae*, *Zereninae*, *Caberinae*, *Acidaliinae*, *Ephyrinae*, *Geometrinae*). II. LARENTIIDÆ (*Lobophorinae*, *Eupitheciinae*, *Larentiinae* [including *Cidaria*]). III. FIDONIIDÆ (*Ortholithinae*, *Sioninae*, *Fidontiinae*, *Légiinae*). IV. HYBERNIIDÆ (*Hyberninae*, *Frantiinae*). V. BOARMIDÆ (*Dasytiinae*, *Boletobiinae*, *Boarmiinae*). VI. AMPHIDASYDÆ. VII. URAPTERYGIDÆ. VIII. METROCAMPIDÆ. IX. ENNOMIDÆ (*Odontoperinae*, *Ennominae*). There are but few alterations in either generic or specific names, although a few genera are rearranged, and some (e.g., *Eupithecia*) are sub-divided. The plates are (for British colour-printing work) very good, but there is a marked difference between what are evidently the old and the new figures. Plates VI. and XI. are the best, and entirely new, and the initials "W.A.P." to the woodcuts indicate that Mr. W. A. Pearce has had a hand in this part of the work.

The following Table will give an idea of the value of the summaries to be found at the end of the chapters:—

	OVA.	LARVÆ.	FOOD-PLANTS.	PUPE.	POPULATION.	IMAGO.	GENERAL REMARKS.
DICRANURIDÆ.							
Ceura, Schrk.	vi.-viii.	vii.-viii.	Willow, poplar	viii.-vi.	In crevices or bark	vi.-vii.	Common [woods
rimula, L.	v.	vi.-vii.	Birch, alder	viii.-iv.	do.	v.	Rare; birch and alder
fuscipes, Bth.	vi.	vii.-viii.	Beech? willow, sallow	viii.-v.	do.	vi.	Widely distributed
fulvula, L.	vi.	vii.-viii.	Poplar, aspen	viii.-v.	do.	vi.	Generally distributed, but rather rare
NOTODONTIDÆ.							
NOTODONTINÆ.							
SPALPUS, Germ.	vi.-vii.	viii.-ix.	Beech, birch, apple	viii.-v.	In leaves	vi.-vii.	Local; in beech woods
tagi, L.							
NOTODONTA, O.	vi.	vii.-viii.	Oak	viii.-v.	Subterranean	vi.	Very local
trepida, Esp.	vi. & viii.	vii. & ix.	Birch, alder, nut	viii.-v.	Under leaves on ground	viii. & vi.	Generally distributed
drumetarius, L.							
trikophus, Fab.	vi.-vii.	viii.	Birch, poplar	ix.-v.	Subterranean	vi.-vii.	Very rare
ziczac, L.	vi. & viii.	vii. & ix.	Poplar, willow, alder	vii. & ix.-v.	do.	viii. & vi.	Generally distributed
LOPHOPTERYX, St.	iv.-v.	vi.-vii.	Birch	vii.-iii.	do.	iv.-v.	Rare
camellia, Esp.	v. & viii.	vi. & ix.	Oak, beech, birch, nut, etc.	vii. & ix.-iv.	Under leaves or moss on ground	viii. & v.	Generally distributed
camellia, L.							
euculla, Esp.	v. & viii.	vi. & ix.	Maple and sycamore	vii. & ix.-iv.	do.	viii. & v.	Very local
PTEROTOMA, Germ.	v. & vii.	vi. & viii.	Willow, sallow, poplar	vii. & ix.-iv.	do.	vii. & v.	Generally distributed
paipus, L.							
GLUPHISA, Bd.	vi.	vii.-viii.	Poplar	viii.-v.		vi.	Probably not British
arenata, Esp.							
PTILOPORA, St.	xi.-iv.	v.-vi.		vii.-x.	Subterranean	x.-xi.	Very local
plumigera, Esp.							
DRYMONIA, H.-S.	v.	vi.-viii.	Oak	viii.-iv.	do.	v.	Local
chaonia, Hb.	v.-vi.	vi.-viii.	Oak and birch	viii.-v.	do.	v.-vi.	Local
timacula, Esp.							
MICRODONTA, Dup.	vi.	vi.-viii.	Birch	viii.-y.	do.	vi.	Very rare
bicoloria, Schiff.							
LEUCOMAPA, St.	v. & viii.	vii. & ix.	Poplar, willow	vii. & ix.-v.	do.	viii. & vi.	Generally distributed
dictes, L.	vi. & viii.	vii. & ix.	Birch	vii. & ix.-v.	do.	viii. & vi.	Local
dictesoides, Esp.							

•

•

•

•

•

•

•

•

•

•

•

•

•





1



2



3



4



5



6



7



8



9



10

W.A.Pearce. del.

OPORAPIA FILIGRAMMARIA.

*Entom. Record, etc., 1896.*

# The Entomologist's Record

## AND

### JOURNAL OF VARIATION.

---

VOL. VII. No. 12.

APRIL 15TH, 1896.

---

#### **Oporabia filigrammaria, its aberrations and life-history.**

By J A CLARK, FES

*With Plate.*

Having recently bred a very fine series of *Oporabia filigrammaria* from eggs, obtained by Mr. Salvage from a female captured at Rannoch, I thought that some account of the specimens, which are very variable, would be not uninteresting to the readers of the *Entomologist's Record*.

The eggs hatched from the 10th–15th of April, 1895, the larvæ were fed on sawfly, and were full-fed about the middle of June. They pupated on the surface of the ground, and the moths began to emerge on August 5th, and continued to do so until November 11th, a total of 89 moths emerging from about 60 eggs. The larvæ are very much like those of *O. dilutata*.

The specimens, as will be seen from those figured in Plate iii., are remarkable in having exceedingly well-developed and ample wings, reminding one of *O. dilutata*. They also, it will be observed, present a wide range of variation in both sexes. If we look upon Figs. 1 and 2 as representing the more usual pale silvery-grey form (ab. *pallida*), and Figs. 3 and 4 the more extreme melanic form in both sexes (ab. *melana*), it will be observed that Figs. 5 and 6 come somewhat intermediate between these extreme forms (ab. *intermedia*). The same general character is present in all, viz., a tendency for the transverse lines to unite to form three or four narrow dark transverse bands on the fore-wings, with an ill-defined narrow band on the hind-wings, the two darker forms having a distinct tendency to extend the dark tint towards the outer margin.

Figs. 5 and 6 show a line of development directly opposed to band formation, and this, I take it, represents the most ancestral form of the species, having retained the parallel lines in a more or less unbanded form; and these remain, one may well suppose, very similar to what was the original form of marking in all the *Larentiidae*. From this point of view, therefore, we may look upon this form as the natural type (ab. *typica*) of the species, i.e., the centre from which the other forms have radiated, some in the direction of a darker, others in the direction of a lighter ground-colour, combined in both these radiations with a tendency for the transverse lines to unite in banded form.

In Figs. 9 and 10 we have two extreme specimens of the fasciated

type, in which the traces of all transverse lines, except the bands, are reduced to a minimum. In ground-colour, Fig. 9 agrees with Figs. 7 and 8, whilst Fig. 10 is, if anything, paler than Figs. 1 and 2. This form we may call *ab. virgata*.

Some of the specimens show a slight tendency to ochreous in the ground-colour of the fore-wings.

As very little is to be found in our text-books about *O. jiliogrammaria* the following information may be useful. The caterpillar is described by Mr. Hellins as feeding on willow, it is stout and smooth, the general colour rich velvety green, the belly pale whitish-green. The head and second segment shining, and having a blackish tinge; on each side of the dorsal vessel is a pale yellowish-green stripe; and on each side are two sulphur-yellow stripes; on the back of each segment, tubercles appear as minute yellow dots; the segmental divisions are orange-yellow; the spiracles are yellow, and between them and the belly are a few speckles. The caterpillars bury themselves in the earth in April to undergo their transformation (Newman, *Brit. Moths*, p. 109). Merrin (*Lepidopterist's Calendar*) gives:—Egg—"September to February"; LARVA—"February to April"; IMAGO—"August and September." It will be observed that these months are not identical with those I record.

The species was first described by Herrich-Schäffer [Sppl., 194, 195—12 L. (H.-S., iii., p. 160, No. 141)]. He writes of it:—"Minor, area media angustiore, omnino obscuriore," which leaves the small central dark-banded inland form the type, so far as it is the first described form. Herrich-Schäffer then says:—"Perhaps only a small, sharply marked variety of *O. dilutaria*; the fore-wings are somewhat pointed, yet they appear stunted (or crippled), for their margin shows a singular 'swing.' The colour and plan of markings agree with the darkest females of *O. dilutaria*, yet the black lines are not so sharp as is usual in that species. The costal area between the two transverse bands and the space between the hinder transverse band and subterminal are the darkest; the two latter (hinder transverse band and subterminal) are the whitest. The hinder transverse band forms in cells 2 and 8, and again on nervure 6, sharper teeth borderwards. The black dots of the nervures are, on account of the dark ground colour, scarcely to be recognised. On the hind-wings the space between the two dark wavy lines, which follow the hinder double stripe, is filled in with dark colour. The underside shows this stripe very broad, especially on the hind-wings, where it is finely divided and borderwards bounded by a broad dark band, basewards of it stand three dark lines, as in *O. dilutaria*. On all the wings the border is sharply lighter behind the subterminal." Mr. Prout says of this:—"Herrich-Schäffer's Figs. 194-195 (upper and under-side) are the small form which I have from the Lancashire Mosses, and quite different from any of the figures in Plate iii. (*Entom. Record*), the central area being (as H.-S. mentions) entirely dark, hence the only pale parts are the lines bounding the small basal patch, the two double white bands (on either side of central fascia) and the sub-terminal. Hind-wings somewhat as in Plate iii., Fig. 9, but still more strongly contrasted, and the dark band nearer the margin."

The earliest British specimens of this species were captured by Mr. Weaver, and he appears to have supplied almost all the British (and

many Continental) lepidopterists with examples about half-a-century ago. His remarks, therefore, should prove interesting. He writes:—"This species (*O. filigrammaria*) is smaller than *O. approximaria*, particularly the male, which varies in size, colour and markings. I captured a good number of it some years ago, high on the side of Goat Fell, Isle of Arran. I found them only in one spot. The search for this insect is a laborious task; I found it by parting the heath with my hands, and steadfastly looking at the stems of the heath, for there they rest by day. They are so completely wrapped round the heath as to be easily overlooked, and greatly resemble a ring of grey moss that grows in similar situations" (*Zool.*, 1852, p. 8496).

Staudinger (*Catalogue*, p. 187) treats Weaver's *filigrammaria*, *approximaria* and *precursaria* as synonymous with the typical form, a remarkable conclusion, considering that Weaver himself diagnoses them and points out their differences; they must, it seems, have at least an aberrational value. He also makes the ab. *autumnaria* of Doubleday and Guenée synonymous with the *polata* of Westwood (*British Moths*, ii., p. 56, Pl. 68, Fig. 9), and diagnoses it as "Major *dilutior*." I am informed by Mr. Prout that in this Staudinger is certainly wrong, for although ab. *autumnaria*, Dbld. = *polata*, Westwood, this aberration is not the *autumnaria* of Guenée. Staudinger also gives as the range of *O. filigrammaria* "N. England, Scotland and (?) Lapland." Guenée writes that "*O. filigrammaria* is without doubt very near to *O. dilutata*, of which species Herrich-Schäffer seems inclined to consider it a variety. It is still nearer to *autumnaria*, Bdv." (not our British form of *O. dilutata* of the same name), "but is always smaller. The superior wings are narrow and more pointed at the apex. The ground-colour is always violet-grey, with the bands darker and more combed (or marked) with black; the line which forms the edge of the basal space is straighter and more oblique. The median space is almost always black, and it forms a sharp angle\* in the cellule. The little band which follows it is more oblique. The lower wings have always a dark band near the margin, surmounted above by two equidistant and almost parallel lines." Guenée's description appears to have been made from specimens taken by Mr. Weaver in the Isle of Arran. He adds that "the caterpillar feeds on *Calluna vulgaris*," and that "the perfect insect rests during the day with the wings folded round the stems of this plant, where it requires some skill to discover it" (*Phalenites*, x., p. 265).

Guenée refers the pale violet-grey insect known as ab. *autumnaria*, Dblday., to this species. This is now usually considered, I believe, to be a form of *O. dilutata*. I am inclined to agree (but am in no wise very certain) that the *approximaria* of Weaver really does belong to *O. filigrammaria*, and not to *O. dilutata*, a conclusion at which Guenée (probably guided by Doubleday) also arrives. Weaver writes of *O. approximaria*, that it is to be "distinguished from *O. autumnaria* by the formation of the superior wings of the female, which are pointed, and are also of a smaller size, having a resemblance to *O. filigrammaria*, and forms a link between the two species. The males are very variable in size, and some specimens are very dark, in fact there are more dark than light ones. I captured a good number

\* This refers to the >-shaped mark at the bifurcation of the median nervure where it leaves the discoidal cell. The dark nervures, often much broken, are very interesting.

in Perthshire in 1851, located in plantations of spruce fir exclusively, some I found at rest on the trunks" (*Zoologist*, 1852, p. 3496). These remarks apply remarkably well in some particulars to the specimens I have described in this article, and which are figured in Plate III.

Whatever uncertainty may rest on the var. *approximaria*, there can be none on the var. *precursaria*, Weaver, which refers to the small form of *O. filigrammaria*, found so abundantly on some of the heaths of the northern English counties. Weaver writes of it:—"This is smaller than all the foregoing species, and differs from the last two (*filigrammaria* and *approximaria*), in the female having ample wings, the male I have not seen. I reared one specimen from a larva that fed on heath, in Perthshire, in 1861" (*Ibid*). It will be observed that most of the females that are figured, and that I bred, have also ample wings, differing considerably from the more pointed-winged form usually found on the moors of the northern counties of England.

---

### Entomological Haunts for a Season.

By J. W. TUTT, F.E.S.

"In a corner of my verandah stands a weapon, always ready, wherewith I do battle against liver, dyspepsia, hypochondria, dull care, loathed melancholy, and multifarious other natural enemies to peace and long life. It is composed of a light springy stick, about five feet long, to which is attached a ring of iron wire, about fifteen inches in diameter, carrying a bag of mosquito-net or gauze, dyed green. The wire is as light as it can be without becoming so thin as to want stiffness, and the gauze of which the bag is made is soft and open enough to be perfectly transparent. The minutest point which may conduce to the perfection of the instrument is worthy of attention, for its virtues are rare. I find nothing equal to it. It is better than Eno's Fruit Salt. To the jaded office slave, the brain-worn student, the overwrought literary or professional man, I recommend this panacea."

There is something humanly healthy about the above quotation of E. H. A., the talented author of *The Tribes on my Frontier*, something that takes one back to the early days when our nets were primitive, and made much in the manner described above, and when I re-read it the other day, after having been engaged in the technicalities of some German descriptions of British butterflies, I breathed a sigh of relief, and came to the conclusion that collecting insects had done my body at least as much good as the study of them in foreign languages had done my temper.

Therefore, when a friend in a very persuasive manner asked me to write a few lines suggesting a series of runs, so that he might fill in his time profitably by making the practical acquaintance of some of our more local species, I could hardly resist the temptation.

Sallowing should be considered first, and I must say that I think this method of collecting is as successfully carried on in one part of the country as another. *Pachnobia leucographa* extends from Folkestone in the east, to York in the north, and Brecon in the west, and *T. miniosa* and *T. populeti*, both have a very wide range; it is not to be expected that the outskirts of large towns will prove favoured haunts for the rarer species, and one must work more widely for them. But it is too late for sallowing this year now. In April a few good

things appear; there is *Asteroscopus nubeculosus* at Rannock, *Xylomyges conspicillaris* recorded from Kent and Herefordshire, and certain to be well distributed over the intermediate country. May brings out a number of species, and two famous localities present themselves: (1) Wicken Fen, where someone has yet to win *Hydrilla palustris*, and where the disappointed entomologist may solace himself with an abundance of *Meliana flammea* and *Viminia albovenosa*; (2) Wye, where, on the Downs, the retiring *Pachetra leucophaea* comes to sugar with *Agrotis cinerea*; whilst an abundance of local species, including *Scoria dealbata*, haunts the same little-known ground. For early June, sugar in Abbot's Wood (or, for the matter of that, any other large wood) is in some seasons the most profitable work. The middle of the month should find the collector in the Breck district—Brandon, Tuddenham, etc.—invading the restricted homes of *Agrophila trabalis*, *Acidalia rubiginata* (*rubricata*), *Acontia luctuosa*, and numerous other rarities, whilst a day or two at Chippenham can then be easily put in for *Banksia argentula*. About the middle of the month, too, a day or two on the marshes below Gravesend or around Ely should be attempted for *Leucania obsoleta* and *Senta maritima*.

During the first fortnight of July the New Forest is tempting, but, for those who prefer the sport, the Agrotids of Freshwater—*lunigera* and *lucerna*—and *Acidalia humiliata* are in full swing. Towards the end of the month it is time that the Broads—Ranworth, Horning—were visited, and the larva of *Nonagria cannae* found. At the same time the general work there is of the most inspiring order, for *Leucania brevilinea* and other Noctuids are abundant. The first fortnight in August is, to my mind, often the most dead of the year, unless one is in Scotland, when this fortnight runs hard the sunny month of June for first honours, for now rarities and local species appear profusely. With the last fortnight in August a return to the Fens should take place, for now the autumnal insects are in full force, whilst with the second week in September, after having spent a few days at Reading for the rarer "Sallow" moths (*Xanthia*), some sheltered and favoured spot on the coast is to be found—Freshwater, Sandown or Folkestone—for *Leucania albipuncta*, *L. musculosa* and *Caradrina ambigua*, or, if these will not appear, *Tryphaena subsequa* and *Aporophylla australis* will reward you. The collectors on the southern coast also know best what to do with the later autumn—Portland for *Heliophobus hispidus* and *Epiranda lichenea*, whilst *Dasy-campa rubiginea* appears to favour most the counties of Hampshire, Dorset and Somerset, and after Dr. Ridings's catch of *Orrhodia erythrocephala*, I should prefer Devon to Kent for a chance of this species; for, as yet, I must confess myself a sceptic as to the reputed Kent haunts of this latter species.

This note strikes me as a fearful sort of confession, likely to put temptation in the way of omnivorous collectors, and to draw down upon me the vials of Mr. Harold Hodge's wrath, but surely a man must be a most unsatisfactory creature who catches more insects than will serve him for the special line of study he professes, or who catches insects without studying them at all. I prefer to agree with E.H.A., as to the mass of entomologists not being by nature cruel. Speaking of this, that author says:—"Another charge brought against entomologists is that of cruelty, and it is even more groundless than that of puerility. Nothing is more unfeeling than ignorance, and

nothing makes a man more compassionate towards his little fellow-creatures than a close acquaintance with them. That acquaintance can only be gained, and is cheaply gained, by sacrificing the lives of a few . . . . . Butterfly hunting is a means not an end. The end is to know them, to become intimate with them, so that, as you move about the garden, or lie dreaming—

Modo sub antiqua ilice,  
Modo in tenaci gramine,  
Labuntur altis interim ripis aquæ,  
Queruntur in silvis aves—

each gay pleasure-hunter that flits by you may be an acquaintance with a character and an individuality of its own."

I am sure many will agree with E.H.A., that we are not such brutes as we are sometimes painted. At any rate, I sincerely trust that, if these remarks should lead any to visit the haunts herein named, they will act up to the standard E.H.A. ascribes to them.

### Tabulation of the Sub-genera included in *Apatela*, Hb., with their respective types.\*

By A. RADCLIFFE GROTE, M.A.

**A. Genus:** *Apatela*, Hb. [1806 (1811)].—**Type:** *A. aceris*.

**Characters:** † PUPA with system of anal spines.

\* LARVA with secondary hairs abundant.

**I. Sub-genus:** *Acronicta*, Ochs. (1816).—**Type:** *A. leporina*.

1.—*A. leporina*, Linn. and var. *bradyporina*, Tr.

**II. Sub-genus:** *Apatela*, Hb. [1806 (1811)].—**Type:** *A. aceris*.

2.—*A. aceris*, Linn.

**Characters:** \*\* LARVA with hairs all weak; secondary often nearly wanting. a. Warts not single-haired.

**III. Sub-genus:** *Cuspidia*, Chapn. (1898).—**Type:** *A. megacephala*.

3.—*C. megacephala*, Fabr.

**IV. Sub-genus:** *Hyboma*, Hb. (1818).—**Type:** *A. strigosa*.

4.—*H. strigosa*, Fabr.

**V. Sub-genus:** *Triaena*, Hb. (1818).—**Type:** *A. psi*.

5.—*T. psi*, Linn. 6.—*T. tridens*, Schiff. 7.—*T. cuspis*, Hb.

**Characters:** b. Warts single-haired; hairs spatulate.

**VI. Sub-genus:** *Jocheaera*, Hb. (1818).—**Type:** *A. alni*.

8.—*J. alni*, Linn.

**Characters:** †† PUPA with anal spines nearly obsolete; anal projection with bunch of bristles.

\*\*\* LARVA with no secondary hairs; warts large with stiff hairs.

a. Stiff hairs intermixed with finer plumy ones.

**VII. Sub-genus:** *Viminia*, Chapn. (1898).—**Type:** *A. menyanthidis*.

9.—*V. menyanthidis*, View.

**VIII. Sub-genus:** *Pharetra*, Hb. (1818).—**Type:** *A. auricoma*.

10.—*P. auricoma*, Fab. and ab. *pepli*, Hb.

**Characters:** b. Stiff hairs mixed with finer plumy ones.

**IX. Sub-genus:** *Arctomyscis*, Hb. (1818).—**Type:** *A. euphorbiae* (= *euphrasiae*, Auct.).

11.—*A. abscondita*, Tr. 12.—*A. euphorbiae*, Fabr. and var. *montivaga*, Gn. 13.—*A. euphrasiae*, Brahm. 14.—*A. ramicis*, Linn.

---

\* *Die Apateliden*, 1895, Rcemer Museum, Hildesheim.

**B. Genus:** *Craniophora*, Snell. (1872) = *Bisulcia*, Chapn. (1893).—**Type:** *C. ligustri*.

1.—*C. ligustri*, Linn.

This genus appears to me to be valid on structural characters, and this name acceptable as a proper restriction of *Polymixis*, Hb. (1818), which latter has then as type: *Polymita*, Linn., "Syst. Phal.," 180. *Seladonia*, Fabr., "Ent. Noc.," 188. *Ridens*, Hb., "Noc.," 20, vide the *Verzeichniss*, 205; but I have not been able to come to a final conclusion, and it is possible that the type *polymita* is untenable, when the present genus will have to be called *Polymixis*. But from the larva the genus must be referred to the *Agrotidae*, the setæ being single and tubercles not being converted into many-haired warts; *Heteromorpha caeruleocephala*, usually referred here, must also be removed from the *Apatelidae*. The generic characters of *ligustri* are the retreating inner edge of primaries, the mixture of flattened scales on the thorax, and the peculiar arrangement of the vestiture, together with the dorsal tufts on abdomen. The character of the vestiture seems to ally the moth to the North American genus, *Chytonix*.

## Larval Genera and Sub-genera in Apatela.

By A. RADCLIFFE GROTE, M.A.

The following classification of the adult larvæ of *Apatela* is drawn up from memoranda furnished by Dr. Dyar, and verified by me, so far as my material allows; (E) stands for the European, (A) for the American species. Where no name follows the section no name has been proposed. As a rule, I consider such naming unnecessary, and that the species may be associated under the preceding sub-generic title.

**Gen. I.**—*Apatela*, Hübn., 1806 (1811). **Type:** *A. aceris*.

Secondary hairs abundant, tending to obscure the warts. [The larva of *leporina* has black hair pencils in young stage on first and third abdominal ("long black hairs on the anterior trapezoidals," Chapman), as the North American *vulpina*, and on the same segments as *americana*. No larva has been yet found in America which can be classed in the same section with *aceris*. Mr. Tutt's statement, *Ent. Rec.*, vii., 59, that *americana* is "really congeneric with *aceris*" is, in any close sense, inaccurate].

1. No black pencils or tufts:

- a. Hairs parted into interlacing pencils: *aceris* (E) = *Apatela*.
- b. Hairs fluffy; black pencils in young: *leporina* (E), *vulpina* (A) = *Acronicta*.

2. With black dorsal pencils on definite segments: *americana* (A), *dactylina* (A), *lepusculina* (*populi*) (A), *felina* (A), an undetermined species (A) = *Megacronycta*.

**Gen. II.**—*Hyboma*, Hübn., 1818.—**Type:** *H. strigosa*.

Hairs all weak, warts reduced in size, secondary hairs often nearly wanting, and warts sometimes single haired.

1. Hairs not single on dorsal warts (i.-iv.):

§ Not green at maturity:

- a. Fleshy humps on segments 5, 12: *psi* (E), *tridens* (E) = *Triæna*.



- b. An elevation on 12 only : *occidentalis* (A).
- c. Elevations on 5, 8, 12 ; secondary hairs clubbed : *morula* (A).
- d. No distinct elevations, black at maturity : *radcliffei* (A) ; *lobeliae* (A).
- § Brown at maturity, rather flattened :
  - e. Warts i.-ii., normal : *betulae* (A).
  - f. Warts i.-ii., single haired : *megacephala* (E) = *Cuspidia*.
- § Green (or brownish) at maturity.
  - g. Green with dark brown dorsal line : *strigosa* (E), *grisea* (A), *tritona* (A), *lithospila* (A), *superans* (A) = *Hyboma*.
  - h. Olivaceous with darker patches : *subochrea* (A).
- 2. Hairs single on tubercles, i.-iv :
  - i. Hairs normal : *ovata* (A), *hamamelis* (A) = *Lepitoreauna*.
  - k. Hairs spatulate, mature larva black with creamy dorsal patches : *alni* (E), *funeralis* (A) = *Jocheaera*.
  - l. Hairs spatulate, but larva brown, no cream spots on back : *afflicta* (A) = *Tricholonche* (described by Dr. Thaxter).

**Gen. III.**—*PHARETRA*, Hübner, 1818.—**Type:** *P. auricoma*.

Warts large, hairy ; no secondary hairs.

- 1. The stiff hairs of warts mixed with fine feathery ones :
  - a. Forming tufts like *Orgyia* : *luteicoma* (A) = *Philorgyia*.
  - b. Not forming such tufts : *euphorbiae* (*myricae*) (E), *sperata* (A), *rumicis* (E), *abscondita* (E), *noctivaga* (A), *pallidicoma* (A) = *Arctomyscis*.
- 2. The stiff hairs not mixed with others : *auricoma* (E), *menyanthidis* (E) (*Viminia*), *impressa* (A), *xyliniformis* (A) (*Mastiphanes*), *oblivita* (A) (*Eulonche*) = *Pharetra*.

## On the Genera in the *Apatelidæ* (= *Acronyctidæ*).

By T. A. CHAPMAN, M.D., F.E.S.

Mr. Grote has been kind enough to send me his paper on *APATELIDÆ*, and Mr. Tutt tells me that he considers I have introduced much confusion into the matter, by not definitely stating whether I consider the three groups into which I divide *Acronycta* to be genera or not. This opinion of Mr. Tutt's, so plainly expressed, appears to compel me to say a few words, and I may first, therefore, criticise Mr. Grote's excellent paper.

The first point that strikes me is the removal of *ligustri* from the *APATELIDÆ* (= *ACRONYCTIDÆ*) to the *AGROTIDÆ*. Though I do not know the species included in *AGROTIDÆ* by Mr. Grote, I have little hesitation in saying that *ligustri* is an *Acronycta*, as proved by the ovum and the newly-hatched larva. Their characters (combined) are not found anywhere except in *Acronycta*, amongst the whole of the *NOCTUIDES* or even *LEPIDOPTERA*.

Mr. Grote's divisions (by adult larval characters) of the remaining *Acronyctas* I find no fault with. His *Pharetra*, Hüb., corresponds precisely with my *Viminia*, excluding, however, *venosa*, which I should now, even more strongly, insist on placing beside *rumicis* than when I wrote my paper, attaching even less value to such adapta-

tional differences in the imagines than I then did; *venosa* is closer to *rumicis* than *rumicis* is to *menyanthidis*, or any other species of *Viminia* (*Pharetra*). He divides my *Cuspidia* into two genera, *Apatela* and *Hyboma*. If I divided them at all, I should divide them into a larger number of sections; but if you divide them only into two, then Mr. Grote's divisions are as good as any others I could suggest.

*Apatela* would have NEWLY-HATCHED LARVA with abnormal segments 6, 10, and 11 pale. PUPA with numerous spines to cremaster. The NEWLY-HATCHED LARVÆ of *Hyboma* would have 6 and 7 either both pale or both dark, and the PUPA with few spines to the cremaster. *Megacephala* has nearly as numerous spines as *leporina*, and is nearest to this group of the *Hyboma*, Hübn., section of Mr. Grote.

Of the other genera that Mr. Grote includes in APATELIDÆ, I incline to allow *orion* to be near *Acronycta*, owing to the weak 11th segment of the newly-hatched larva.

*Demas* I prefer to place with LIPARIDÆ, as also *coenobita* and *ludifica*, of which, however, I have had too little material for study to make my opinion of much value. All these—*orion*, *coryli*, *coenobita*, *ludifica*—differ from *Acronycta* proper, in having spherical instead of flat eggs, and from typical *Liparidæ*, in the eggs being very distinctly ribbed.

To return to Mr. Tutt's question, I fear I shall disgust him, by saying that the question of genus or sub-genus is more a personal than a scientific one. A genus is a group of species, and the chief determining factor is that of size and convenience. When you classify say, the NOCTUIDES, you make groups of convenient size, then you try to form a measure of the difference between these several groups; you then rearrange the groups, so that the difference between any two contiguous groups shall be of about the same value as those between any other two groups. Here and there you have a species so isolated that it unquestionably forms a genus by itself, elsewhere you have groups so large that you try to sub-divide them, and have to be satisfied to do so on less important characters than, as a rule, you like. The *Acronyctas* are a portion of the NOCTUIDES, on the classification of which Mr. Tutt is an expert, and I am not; but looking to the very slight characters that separate some accepted genera amongst the NOCTUIDES, I should imagine that not only are *Cuspidia*, *Viminia* and *Bisulcia*, good genera, but that *Cuspidia* must be sub-divided into genera much like the sub-genera into which Mr. Grote divides this section.

Mr. Tutt may say that my description of how you arrive at genera is not in accordance with fact. Few systematists assume for themselves so clear a field to start with as my description implies; but I think, with this circumstance in view, my description is correct; and that, therefore, in the case of a genus of NOCTUIDES, it falls rather to Mr. Tutt than to me to say whether the distinction between the groups are of generic value, as it is estimated amongst the NOCTUIDES.

I have, however, much sympathy with those who object to sub-genera altogether; call a group a genus or leave it alone. Anything that is worth separating under a name is a genus.

## The Destruction of Insects.

By HAROLD HODGE, M.A.

I have often wondered why so many collectors of insects should be so ambitious of emulating Keating. Why do they devote themselves so keenly to fulfilling the functions of a fly-paper? If they do not cry themselves through the streets as first-class killers of all flies, bugs, and beetles, they are certainly not less persistent and successful at "catching 'em all alive." Many of them seem seriously to think that the *raison d'être* of an insect is to be caught, and the *raison d'être* of a man to catch it. No wonder that the world should come to the conclusion that these creatures are not men, and regard them as lunatics, harmless so long as their destructive mania does not extend to anything more important than butterflies. But to the educated man with some feeling for nature and some sense of beauty, they are an object of active dislike. He sees them industriously labouring to diminish one of the charms of the country; and his indignation is not lessened when he finds these destroyers dubbing themselves naturalists because they have impaled their victims on pins, and talking complacently of science when they are able to refer to some familiar butterfly by a Latin word, which they do not understand, and usually cannot pronounce without perpetrating some hideous false quantity. He sees clearly enough that the truth about these people is not that they do care for science or study natural history, but that they do not care for nature and are destitute of all æsthetic sense. He accordingly contemns them, and votes entomologists and entomology a fraud.

This may seem a foolish and superficial conclusion to us who know better, but if we will be honest and look at the matter from an outside point of view, we must admit that such a generalisation, although erroneous, is very natural, and that there is much in the conduct of collectors to justify it. I do not hesitate to say from my own experience that there are many who take no interest whatever in insects except as specimens to be captured and placed; who can see nothing in a butterfly in the field. We have an evidence of this in the small proportion of observations on insects as they live, to records of captures and disputes as to names in our entomological journals. These people are willing to destroy any number of insects in the hope of discovering and possessing themselves of a single abnormality. I have seen them on the look-out for "vars." of *Lycaena icarus* callously insisting on destroying a captive, on the ground that they could not properly examine it alive. There are others to whom it is an irresistible pleasure merely to get possession of any insect they see alive; they accordingly take hundreds more than they want of the commonest species.

It is this kind of thing, this itching to collect for its own sake on the one hand, and the tendency to study insects in the cabinet rather than in the field, on the other, that I deprecate.

There are two special aspects of this subject: the taking of insect life for the purposes of scientific discovery, and the destruction of rare and local species. The former, of course, is on a different plane from anything we have yet been considering. True scientific experiment must have the material required to the extent to which it

can be obtained. If physiological theories cannot be worked out without a great sacrifice of insect life, regrettable as it may be, the sacrifice must be made, even to the extent of experimenting on living insects. On this subject I do not see that we can do more than express the confident hope that scientists will not be more destructive than is necessary, and that their researches and discoveries will lead them, and the rest of the world who learn from them, more and more to appreciate and interest themselves in creatures whose economy they have been investigating.

The other matter, that of the extinction of rare and local species, may appear the most-practical and urgent point to be considered in this connection. That many scarce species, and especially local insects, are surely and even rapidly on their way to final disappearance, will hardly be questioned. As to the causes of this process, there may be more controversy. It is enough for me, however, that dealers and entomologists unsparingly ravage these species, and take them in such large numbers as must inevitably tend to make them sensibly and continually scarcer, whether this over-collecting can account for the whole phenomenon or not.

For dealers, whose murderous raids have seriously thinned colonies of many local species (*Sesia chrysidiformis*, amongst others, at Folkestone),\* there is much excuse. It is their living, their business, and it can hardly be expected that considerations of science or sentiment should stand against the exigencies of wage-earning. There ought not, of course, to be such a thing as a dealer in insects (I am not speaking of makers of apparatus); but that there are such things is the fault, not of these "naturalists" themselves, but of entomologists who make them possible by encouraging the trade.

Look at it any way we may, entomologists are themselves the greatest sinners. With most of them the only rule as to local species and varieties seems to be to leave nothing they can take away. Looking over a few back numbers of the *Entomologist*, I find one collector has taken fifty-one *Sphinx convolvuli* in less than a month, while another has taken seventeen *Sphinx pinastri* imagines in one year, and boasts one hundred of the larvæ. Then I see at least one hundred *Callinorpha hera* have been taken in one locality in a single season, forty-eight of these going to a single individual.

I do not mention names, as I have no desire to pillory individuals who are probably no worse than others who, if they did not take as many, doubtless, like Alice's "carpenter," took as many as they could get. But one name I may refer to as going to illustrate my point that it is not merely unscientific "fly-catchers" who are to blame in this matter. We have a scientist like Mr. Frohawk, complaining (*Entomologist*, September, 1892) of the editor of the *Field* because he will not specify in more precise terms than "N. Kent," the locality where *Aporia crataegi*† had been taken during the season, and that, too, in spite of a significant hint of the editor that "others were left to continue the

\*We should be surprised to learn that *S. chrysidiformis* has been seriously thinned at Folkestone. In 1893 and 1894 we have reason to believe that it was as abundant as usual.—Ed.

† There is, of course, good reason for this. It is well known that *A. crataegi* is extinct as British, that it has recently been planted out in many places, and it is the duty of every entomologist to attempt to explain recent appearances.—Ed.

species." As it seems to me, "N. Kent" is exactly the geographical description required for any purpose of science, but happily such as would baffle the dealer and the "omnivorous collector." In the same number Mr. Frohawk informs us that his series of *Colias edusa* consists of "sixty" specimens, which vary very little. What purpose is served by destroying sixty of this most beautiful species, when twenty would serve any purpose, scientific or æsthetic?

Surely the time has come when this sort of thing ought to be stopped. Cannot entomologists organise themselves for the purpose of the preservation of these rare and local species? Cannot the Entomological Society of London take the lead in educating the mass of entomologists to somewhat higher aims and more rational methods in the collection of insects?

It is to the interest of all its votaries that our delightful pursuit should be vindicated from the damaging charges which it has incurred by its abuse.

### The Classification of the British Butterflies.

By J. W. TUTT, F.E.S.

My note on the "Genera in the Sub-family *Lycaeninae*" (*ante.*, p. 219) has brought me several enquiries, which suggest that a List, (1) illustrating, as far as a linear arrangement can do so, the relationship of our British butterflies as indicated by recent researches, (2) including the more recently defined genera under their assumed titles, would be welcomed by many of our readers. The following has been compiled as the result of the careful correlation of the various schemes which have been recently placed before the entomological public.

#### RHOPALOCERA.

Super-family: **HESPERIDES.**

Family: **HESPERIDÆ.**

Sub-family: **HESPERINÆ.**

Tribe: *Hesperidi.*

*Nisoniades*, Hb., tages, L.

*Syrichthus*, Bdv., malvæ, L.

Tribe: *Pamphilidi.*

*Pamphila*, Fab., sylvanus, Esp.  
comma, L.

*Thymelicus*, Hb., actæon, Esp.  
lineola, Ochs.  
thaumas, Hufn.

Tribe: *Cyclopidi.*

*Carterocephalus*, Ld., palæmon, Pall.

Super-family: **PAPILIONIDES.**

Division: **Lycaenida.**

Family: **LYCÆNIDÆ.**

Sub-family: **LYCÆNINÆ.**

Tribe: *Chrysophanidi.*

*Chrysophanus*, Hb., dispar, Haw.  
phlæas, L.

Tribe: *Lycaenidi.*

*Lycaena*, Fab., arion, L.

*Cupido*, Schrk., minima, Fuess.

*Nomiades*, Hb., semiargus, Rott.

*Polyommatus*, Latr., corydon, Poda.

bellargus, Rott.

icarus, Rott.

astrarche, Bgstr.

*Plebeius*, Linn., ægon, Schiff.

*Everes*, Hb., argiades, Pall

*Cyaniris*, Dalm., argiolus, L.

*Lampides*, Hb., boetica, L.

Tribe: *Theclidi.*

*Callophrys*, Billberg, rubi, L.

*Zephyrus*, Dalm., quercus, L.

betulæ, L.

*Thecla*, Fab., w-album, Kn.

pruni, L.

Family: **LEMONIDÆ.**

Sub-family: **NEMEOBINÆ.**

Tribe: *Nemeobiidi.*

*Nemeobius*, St., lucina, L.

Division: **Papilionida.**

Family: **PAPILIONIDÆ.**

Sub-family: **PAPILIONINÆ.**

Tribe: *Papilionidi.*

*Papilio*, Linn., machaon, L.

Family: **PIERIDÆ.**

Sub-family: **PIERINÆ.**

- Tribe: *Aporidi*.  
*Aporia*, Hb., *cratægi*, L.
- Tribe: *Pieridi*.  
*Pieris*, Schrk., *brassicæ*, L.  
*rapæ*, L.  
*napi*, L.  
*daplidice*, L.
- Tribe: *Anthocaridi*.  
*Euchloë*, Hb., *cardamines*, L.  
*Leucophasia*, St., *sinapis*, L.
- Tribe: *Rhodoceridi*.  
*Colias*, Fab., *hyale*, L.  
*edusa*, Fab.  
*Gonepteryx*, Leach, *rhamni*, L.
- Family: NYMPHALIDÆ.  
Sub-family: NYMPHALINÆ.
- Tribe: *Argynnidi*.  
*Dryas*, Hb., *paphia*, L.  
*Argynnis*, Fab., *lathonia*, L.  
*adippe*, L.  
*aglaia*, L.  
*Brenthis*, Hb., *euphrosyne*, L.  
*selene*, Schiff.
- Tribe: *Melitæidi*.  
*Melitæa*, Fab., *athalia*, Rott.  
*cinxia*, L.  
*aurinia*, Rott.
- Tribe: *Vanessidi*.  
*Vanessa*, Fab., *io*, L.  
*Euvanessa*, Scud., *antiopa*, L.  
*Aglais*, Hb., *urticæ*, L.
- Eugonia*, Hb., *polychloros*, L.  
*Polygonia*, Hb., *c-album*, L.  
*Pryameis*, Hb., *cardui*, L.  
*atalanta*, L.
- Tribe: *Nymphalidi*.  
*Limenitis*, Fab., *sibylla*, L.  
Sub-family: DANAINÆ.
- Tribe: *Danaiidi*.  
*Anosia*, Hb., *archippus*, L.  
Family: SATYRIDÆ.  
Sub-family: APATURINÆ.
- Tribe: *Apaturidi*.  
*Apatura*, Fab., *iris*, L.  
Sub-family: SATYRINÆ.
- Tribe: *Parargidi*.  
*Pararge*, Hb., *megæra*, L.  
*egeria*, L.
- Tribe: *Hipparchiidi*.  
*Hipparchia*, Fab., *semele*, L.  
Sub-family: EREBINÆ.
- Tribe: *Epinephelidi*.  
*Epinephele*, Hb., *janira*, L.  
*tithonus*, L.
- Tribe: *Coenonymphi*.  
*Coenonympha*, Hb., *tiphon*, Rott.  
*pamphilus*, L.  
*Enodia*, Hb., *hyperanthus*, L.
- Tribe: *Erebiidi*.  
*Erebia*, Dalm., *æthiops*, Esp.  
*Melampias*, Hb., *epiphron*, Knoch.  
*Melanargia*, Meig., *galatea*, L.

## Stray Notes on the Macro-Lepidoptera of Dulwich and Neighbourhood.

By DOUGLAS C. BATE.

The Rev. Theodore Wood, writing in the *Boys' Own Paper*, told its readers that they should turn their attention to any branch of entomology rather than Lepidoptera, as "we know pretty well all that there is to be known about them." I do not share this opinion, as I believe there are many things yet unknown, and my reasons for reading this paper are twofold. First, I trust to elicit a mass of information from many of the members present, and secondly, I believe we pay too little attention to our immediate neighbourhoods, and think nothing can be done without going to distant places. London is to some extent played out, but a good many things still exist within its smoke area, and I feel certain that solid service is rendered to our successors by reliable records of the capture of common insects, just as records of now extinct forms by our predecessors are of value to us. Twelve years or so ago what is now East Dulwich consisted largely of pretty open fields. The bare plot of builder's rubbish, dignified by the name of a garden, extending some thirty by twenty feet from my back door, is my constant collecting ground, its split oak fences being adorned with pieces of virgin cork, on which I put my sugar, and a marvellous number of insects visit it.

Without further preamble I will proceed to my task. *Pieris brassicæ*,

*P. rapae*, *P. napi*:—The first scarce, a few larvæ are found in the garden on *Nasturtium* (Indian Cress), they rest on the underside of leaves and stalks; *P. rapae*, common, its larvæ feed on the same plant, usually lie on the upper side of the leaves and along the midribs, those on the darker varieties of *Tropæolum* darker in colour than the others; *P. napi* is not a garden visitor, but is common on waste places at Honor Oak Park, etc. *Colias edusa*: I took two splendid specimens of var. *helice* at Honor Oak Park on August Bank Holiday, 1892, and a worn specimen of the type, but have not seen the insect since. *Vanessa urticae*, *Pyrameis atalanta* and *P. cardui*:—*V. urticae* occurs sparingly in the district, but does not visit the garden, nor have I found its larva. *P. atalanta* came freely to sugar in my back garden in the great sugar year, 1893. It almost always appeared quite late in the afternoon, and I do not remember a single one turning up in the morning. I found a single larva of *P. cardui* feeding on a composite plant in my garden. The species is moderately common in the district, but occasionally disappears; for instance, I did not see it at all last year. Mr. Reginald S. Sellon (*Ent. Record*, ii., pp. 163-4) mentions *V. polychloros* and *V. io*. *Epinephile ianira* and *E. tithonus* are moderately common on waste places, but not garden visitors. *Pararge megaera* is recorded by Mr. Sellon. *Coenonympha pamphilus* is very common on waste places. *Chrysophanus phloæas* is also very common, its larvæ feeding on, I believe, *Rumex pulcher* (Fiddle Dock). They are hard to see, as they occupy the centre of the plant where their bodies are about the same size as, and the crimson dorsal line and broader spiracular stripe render them very like, the young curled-up leaves. *Polyommatus icarus* is occasionally caught in the neighbourhood; *Cyaniris argiolus* is mentioned by Mr. Sellon as scarce, and Mr. Jno. A. Helps (*Ent. Record*, ii., p. 140) adds *Pamphila sylvanus*. The district is thus credited with 17 of the Rhopalocera, of which I have taken 12, and my garden has produced four.

*Sphinx ligustri* is recorded by Mr. Helps. Mr. Sellon says it is not uncommon, and mentions *S. convoluti*. *Smerinthus ocellatus*, *S. populi* and *S. tiliae* occur. The first is scarce, one at a street lamp being my only record, and the larva never. *S. populi* is common, flying in the garden immediately after dusk, and coming straight into the house to the nearest light, if the windows are open. In 1894 I captured a female ovipositing on *Populus alba*; she gave me some 300 ova, which, on hatching, I was surprised to find would not feed on that tree. I divided the brood, placing a number on *P. balsamifera*, which was at once taken to. Those left on white poplar all died, whilst the others took any variety indifferently except that, which they completely refused. One of these larvæ had red stripes, and produced a redder imago than any of the others; they fed exclusively at night, remaining in the "Sphinx" attitude all day. Pupation takes place on, or immediately under, the surface of the ground, without any case being spun, the position of the pupa being indifferently head up, head down, or on its side, the perfect insect usually emerging in the morning; sometimes in the autumn if kept indoors, even in a room without a fire. I have failed to breed the hybrid between *S. populi* and *S. ocellatus*, although I have on one or two occasions hatched out the larvæ. *S. tiliae* is fairly common, the larvæ feeding on the large elm trees, apparently high up, as they have been knocked

down by a football kicked up into one of the trees, and are found walking about on the trunks and on the ground after a high wind. I never took this larva on lime; I regard it as difficult to feed, as it requires clean and fresh food, which is not easy to obtain with a quick withering tree like elm. Mr. Ilston Cox has taken *Macroglossa stellatarum*.

Of the so-called BOMBYCIDES Mr. Helps records *Hylophila prasinana* and *Nola cucullatella*; Mr. Heasler, *Lithosia lurideola*, and I have seen *Euchelia jacobaeae*; *Arctia caia* appears to be almost extinct, one larva in 1892, and one last year in my garden, being my only records. *Spilosoma lubricipeda* and *S. menthastris* both swarm; their larvæ seem to eat everything except the Cruciferae, including Virginia creeper, which does not seem to be attacked by many things. *Porthesia chrysorrhoea* is recorded by Mr. Helps; *Dasychira pudibunda*, larva seen for the first time last autumn; *Orgyia antiqua* common—I think it is parthenogenetic, as I have hatched larvæ from ova laid by presumably virgin females; *Cilius glaucata* common, it has two broods, and both in 1893, and 1895 had, I fancy, a partial third; *Dicranura vinula* seen once; *Lophopteryx camelina* I add from Mr. Helps' list; *Phalera brucephala* excessively common, its larva sometimes strips every lime tree in the neighbourhood; *Gonophora derasa* and *Thyatira batis* are occasionally taken at sugar. Mr. Cansdale records *Cymatophora fluctuosa*; *Asphalia diluta* taken freely at sugar, 1893, but not seen since; *Platypteryx falcula* taken by Mr. Cox. This gives the district 19 species of so-called BOMBYCIDES and PSEUDO-BOMBYCIDES, of which I vouch for 12, and took 4 in my garden.

*Bryophila perla*, taken by Mr. Heasler; *B. muralis* by Mr. Cox; *Acronycta tridens*, *A. psi*, *A. aceris*, and *A. megacephala* are all common as larvæ and sitting on fences; Mr. Cox records *A. rumicis*. *Leucania conigera*, *L. lithargyria*, *L. comma*, *L. impura* and *L. pallens* are all common, except *L. comma*, both flying and at sugar; *Calamia lutosa*, one specimen on a street lamp in 1893; *Gortyna ochracea*, one taken at light; *Hydroecia nictitans*, *H. micacea*, both scarce, at sugar; *Axylia putris*, excessively common at sugar in 1893, but only sparingly since; of *Xylophasia lithoxylea*, *X. monoglypha* and *X. scolopacina*, the first two common everywhere; *X. scolopacina* came to sugar freely for the first time last year. *Dipterygia scabriuscula* is fairly common at sugar; *Neuronia popularis*, one at light; *Cerigo matura* simply swarmed in 1893, flying over rough grass slopes at, and immediately after dusk, and then coming freely to sugar. I failed to find the larvæ in the spot where the perfect insect had swarmed, both in '94 and '95, and only saw two or three imagines. *Luperina testacea* is common on fences close to sugar patches, which, however, I never remember its getting on; it also visits flowers of *Senecio jacobaeae*. *Manestra brassicae* and *M. persicariae* swarm everywhere. As they feed at night, why do the larvæ of the latter stick to the brown stems of *Chenopodium* when of the brown variety, and to the green leaves and green stems of *Filix mas* in my garden, when that is their colour? *Apamea basilinea*, *A. gemina*, *A. ophiogramma*, *A. didyma*, all common, except *A. ophiogramma*, which appears to be common wherever there is ribbon grass, which I cannot grow, as the cats eat it. I have taken it hovering over *Nicotiana affinis* just before dark, its flight being peculiarly like the floating of a thistle-down or piece of gossamer. *Miana strigilis*, *M. fasciuncula*,



*M. literosa*, *M. bicoloria* are all common, except *M. literosa*, and taken at sugar. I venture to say the first two are distinct species, as the larva of *M. strigilis* is, I think, greener and more transparent than *fasciuncula*, which also has a darker head. *M. strigilis* is, I think, the first to appear. I noted them on May 20th and 27th, in 1898. *M. strigilis* ab. *aethiops* is the commonest with us. Mr. Cansdale adds *Chortodes arcuosa*. *Grammesia trigrammica*, occasional specimens everywhere at sugar, but usually in bad condition; *Caradrina morphus*, *C. taraxaci* and *C. quadripunctata*, all come freely to sugar, and Mr. Cox adds *C. alsines*. *Peridroma suffusa*, *P. saucia*, *Agrotis puta*, *A. segetum*, *A. exclamatoris*, *A. nigricans*:—*A. puta*, swarmed at sugar in 1898, and remained in good condition from July 21st to October 16th; it comes every year, but not so freely as in that, for us, phenomenal sugar year. *P. suffusa* and *saucia* scarce, the rest swarm always; dark females of *segetum* and pretty varieties of *exclamatoris* were common last year; indeed, a long, dry, warm summer, like we then had, appears fertile in varieties of everything. *Noctua plecta*, *N. c-nigrum*, *N. triangulum*, *N. rubi*, *N. xanthographa*:—Of these *N. plecta* and *N. triangulum* are scarce, the others common; *N. xanthographa* swarming. I fancy I have also taken *N. dahlia*, but am not sure. Mr. Heasler has taken *N. bata*, and Mr. Cox, *N. festiva*; *Tryphaena ianthina*, *T. orbona* and *T. pronuba* are all common, the first usually flies very swiftly round and round in a small compass just about dusk; all three come to my garden. *Amphipyra trago-pogonis* common at sugar, but hard to get good, as its scales seem so loosely attached; *Naenia typica* larvæ common in the garden, feeding on all sorts of plants, imago freely at sugar and on fences. It has two main varieties as to colour, but otherwise seems a very stable insect. *Mania maura*, flying at dusk and at sugar, where it usually appears very late at night, often midnight.

*Taeniocampa gothica*, *T. incerta*, *T. stabilis*, *T. pulverulenta*:—*T. gothica* and *T. stabilis* are scarce, the other two common; they all come to street lamps, off which they drop if touched, and sham dead for some minutes. All but *T. gothica* are garden visitors, and all come to sugar, and are found on fences. I think *T. incerta* feeds on elm, because I dig the pupa under that tree. *Dyschorista suspecta* and *D. upsilon*, both at sugar for the first time last year, the first freely, the latter only one specimen. Mr. Helps adds, *Orthosia lota*. *Anhocelis pistacina*, *A. lunosa* and *A. litura* are all fairly common at sugar. *Orrhodia vaccinii* is very common at sugar, and was very variable last year. Mr. Helps records *O. ligula*, which I have specially looked for without success. The Rev. Theodore Wood recorded *Oporina croceago* in 1884; I took one specimen of *Xanthia citrargo* at sugar in my garden in 1898, and occasional specimens of *Mellinia circellaris*. As I bred a large number of this, as well as *X. fulvargo* and *X. flavargo* last year, and scores escaped, they may all turn up this year in the neighbourhood. I had no difficulty in isolating *M. circellaris* larvæ from the other two, between which I missed the distinction. *Calymnia trapezina*, *C. diffinis*, *C. affinis*:—The first common and in infinite variety; I fancy the 1895 specimens were generally lighter than usual, and suggest the long, dry summer as being the cause. *C. diffinis* and *C. affinis* scarce, although elms are common. *Dianthoecia cucubali*, two at sugar; but have failed to find any

*Dianthoeceae* larvæ on the *Lychnis*. Mr. Heasler records *D. capsincola*; *Hecatera serena*, once at sugar and once on a fence; *Miselia oxyacanthæ*, twice at sugar and once at ivy bloom; *Euplexia lucipara* swarms at sugar, and has, I think, two broods; *Phlogophora meticulosa* is also common at sugar, always has two broods, and in 1893 both it and *E. lucipara* had a third. *Hadena trifolii*, *H. oleracea* and *H. pisi*: the first two swarm everywhere, the third is scarce. Its larva feeds on broom and bracken, on the former it usually has rose-pink stripes, on the latter yellow; but this distinction is developed about the third change of skin, all the little ones being yellow. They also feed on grasses. They are subject to a curious epidemic on arriving at the last skin, when many dry up without shrivelling in the least, and look quite alive until touched. They feed by night, and go down to the base of the food-plant by day. Mr. Heasler adds *H. thalassina*. *Cucullia umbratica* is listed by Mr. Helps, *C. chamomillæ* by Mr. Cansdale, and *Epunda viminalis* by Mr. Cox.

*Gonoptera libatrix*, one worn specimen at sugar last spring in my garden; *Habrostola triplasia*, one at sugar in 1893; *Plusia chrysis* and *P. gamma*—the first used to be moderately common in one spot which is now built over—the latter, of course, swarms. *Erastria fasciana*, recorded by Mr. Cansdale; *Euclithia vi*, by Mr. Cox; *Catocala nupta*, freely at light and sugar, and early in the morning on fences.

*Zanclognatha grisealis* and *Z. tarsipennis* are both occasionally taken at sugar; also *Hyppena rostralis* and *H. proboscidalis*. All four occur in my garden. The district has therefore yielded 101 species of the NOCTUIDES, of which I have taken 84 and found 60 in my garden.

Of the larger INCOMPLETE we get the following:—*Sesia tipuliformis*, taken by Mr. Heasler; *S. myopiformis*, taken by Mr. Cansdale (*Ent. Rec.*, ii., p. 69). *Zygaena jilipendulæ* I captured at Honor Oak Park in 1893. Of *Hepialus humuli*, *H. sylvinus*, and *H. lupulinus*:—the first and third abundant. The males of *H. humuli* start into flight simultaneously, hundreds will suddenly appear, swinging to and fro in their characteristic manner. The females fly with great swiftness, and do not swing like the males, which they appear to knock over in their flight and immediately pair with. *H. sylvinus* I have taken but once. *Gossus ligniperda*, larva common, feeding on poplar and willow. Two or three years ago hundreds were lying around the poplars on Peckham Rye, killed, I believe, by the County Council men. They spin a cocoon to hybernate in, come out in the spring, change their skins, pupate almost immediately, and emerge in about a couple of months. I had eggs in 1894 from a virgin female, but they were infertile, so I failed to confirm parthenogenesis. *Zenura pyrina*, although considered common, I fail to find. I am told I should not look on the lamps, but on the ground under them, where the insects will be found quietly at rest. A female *Z. pyrina* once laid an enormous number of eggs in the match-box in which she had been confined; they were orange-coloured, and formed an irregular sphere about half-an-inch in diameter; as they soon shrivelled considerably I thought them infertile, but still kept them. In a couple of months they began to darken, ultimately becoming sienna brown, and finally hatched out simultaneously, the whole ball rolling over and over with the struggle of the mass of larvæ to escape. A few took to

pieces of the wood of apple, poplar, and horse-chestnut, with which they were supplied, getting between the bark and the wood; but the bulk took to some fragments of cork, which they consolidated into a mass with their spinings. I however failed to get them through the winter. They were orange-yellow with black warts, from each of which sprang a single hair, and had brown heads, and a brown shield on the second segment. The first change of skin, which took place in about four weeks, showed them lighter in colour but otherwise unchanged, and none survived this state.

I have not yet had time to identify the place of capture of my insects beyond this point, but the foregoing list, which contains 150 species for the district, 116 of which I can vouch for myself, and 69 of which have come from my garden, may, I believe, be thoroughly relied on, as far as my own observations go, as containing nothing which I have not caught in the district, and everything which I have.

### Coleoptera at Cromer and Horning.

By E. G. ELLIMAN.

As my visit to Cromer last summer was the second within two years (having spent my summer holiday there in 1894), I did not expect to return overlaid with spoil, especially as I had also made up my mind to take things pretty easily; so with small ambitions, and a mind prepared to be contented with small mercies, I entered upon what turned out to be a most enjoyable, and not altogether unprofitable, time as far as beetles were concerned.

I have most vivid remembrances of the amount of time and toil expended in a fruitless search for the very local *Nebria livida* in 1894; last summer, however, during a short evening's stroll, I came upon two fine specimens of this distinct beetle, hidden under a fisherman's discarded nether garments. The somewhat equivocal method of collecting (*i.e.*, turning over "old Clo"), which secured for me the first specimens of *N. livida*, also obtains for one a large amount of attention from visitors on the beach, especially when the performance takes place about midway up the cliff, as it did in my case; but this chance capture gave me the clue to the head-quarters of the species.

The *Bembidia* abounded at this spot; they were for the most part *anglicanum*, a species of which I only took two specimens in 1894, and these might possibly have remained unidentified had not my friend Mr. Newbery called my attention to the fact that the species had been taken at Cromer before. *Bembidium affine* (1) and a few *B. lunatum* were keeping *B. anglicanum* company. *Tachypus pallipes* was also common here. I did not allow many spikes of either *Reseda lutea* or *R. luteola* to remain uninspected, and a small series of *Ceuthorrhynchus resedae* was the result. *C. cyanipennis* and *C. picitarsis* (1) occurred on the same plants; these two species would thus appear to be indifferent as to whether they feed on plants of the *Resedaceae* or the closely allied *Cruciferae*, which latter order they usually affect. On examining the *Bledii* occurring on the sandy spots on the cliffs, I found *B. pallipes* the most abundant. *B. opacus* came next in point of numbers, and 2 *B. crassicollis*, and in company with them plenty of *Dyschirius thoracicus* and *Heterocerus marginatus*. Whilst poking the sand about, hunting up the *Bledii*, I stirred up a couple of *Amara fulva*.

My resolution to take things easy was broken on two occasions, when I made day excursions to Horning, and worked in earnest on each occasion. By a study of the map and rail time-table, I found that half-an-hour in the train would take one to Wroxham station, from thence a tramp of two or three miles lands one at Horning, add to this the fact that the G.E.R. is obliging enough to take you to Wroxham and back for the modest sum of 1s., and that fen-collecting was to me hitherto an unknown pleasure, is it then any wonder that the temptation was too great to be resisted? On Thursday, June 27th, I set forth from Wroxham station about 9.35 a.m., quite prepared for a hot and dusty tramp to my destination; but fortune favoured me early in the day, as a good-natured farmer gave me a seat in his gig. He informed me he guessed I was going to Horning, by the fishing-tackle I carried. When I had to confess that the "fishing" was to be for beetles, not fish, I am afraid I fell pretty low in his estimation; but probably regained his good opinion somewhat when I proved able to tackle some Norfolk old ale with him at a wayside inn. I suppose he judged that being imbecile enough to collect beetles, such strong liquor would certainly be too much for me, for he warned me of its potency.

Arrived at Horning, fresh, and quite ready for some hard work, I started to work round a promising-looking reed bed. *Donacia nigra* and *D. menyanthidis* were soon dropping into the umbrella, and some distance in the reeds I swept a fine specimen of *Lixus paraplecticus* off the flowers of *Cicuta virosa*, and *Donacia cinerea* (3) turned up near the same spot, apparently on a tall growing *Carex*. Walking up the side of a dyke, I spied a *Donacia* sunning himself on a water-lily leaf; the only chance of reaching him was to wade in, this I did, and a fine *D. crassipes* was the reward for my trouble, and the risk I ran of posturing legs uppermost, with my head in a foot or more of the filthiest black mud imaginable, owing to several treacherous holes in the bottom of the water-course. *Silis ruficollis* occurred sparingly all over the marshy ground. By sweeping I took several *Meligethes obscurus*, *Tachyusa umbratica* (1), and a single *Strangalia 4-fasciata* settled on a reed. Of *Donacia dentipes* I found several specimens, and *D. lemnæ* and *D. semicuprea* were about in swarms.

My second visit was a week later, and was a very favourable day for collecting; not much sun, but fine, with a light breeze, which dropped altogether in the afternoon, leaving the air hazy and close, just the time when beetles evidently love to take a quiet ramble, for change of scene, or some other object best known to themselves. On such occasions even water-beetles are not content with remaining in their natural abode, but come climbing up the reeds and rushes by the waterside preparatory to flight, and, doubtless, this is the reason why three examples of the rare *Hydroporus neglectus* found their way into my sweep-net at Horning, and also 4 *H. umbrosus*. Sweeping altogether on this day was a paying game, for early in the day I secured by this means a few more *Donacia dentipes* and *D. impressa* (2), on *Spartanium ramosum*, and the following were also captured: *Amalus hoemorrhous* on *Brassica cheiranthus*, *Rhinonchus gramineus* on *Polygonum amphibium*, *Olibrus millefolii* (2), *Psylliodes picina* (1), *Ceuthorrhynchus viduatus* (1), *Thyamis holsatica* (2), *Telephorus thoracicus*, and a single *Odacantha melanura*.

By beating willows I captured *Scirtes orbicularis* (2), and saw several more, but they were most provokingly nimble on their legs, apparently more so than their commoner relation, *S. hemisphaericus*; *Galerucella lineola* (1) was also beaten from willow.

Some large pieces of fungus on old willow trees raised my hopes rather high; however, the beetle tenants were by no means plentiful, for beyond a few *Epuraea limbata* and *Dacne humeralis*, together with a single *Cis bidentatus* and *Gyrophæna nana* (4), there was nothing notable in them. As there seemed to be some larvæ in them, I carted a few pieces home, and bred plenty more *Dacne humeralis* and *Mycetophagus piceus* (3). Just before leaving the fen I turned over some dead reeds, by the river bank, and disturbed one or two *Anchomenus puellus*, *Bembidium femoratum* and *Paederus riparius*.

The walk back to Wroxham gives one ample time to contemplate the possibilities of a man who could spend two years (or 20 for the matter of that) instead of two days collecting insects, and studying the life of the marshes at Horning.

## Entomology, Evolution, and Romance: a plea for a new departure.

By FREDK. W. FROST.

In a paper like this the main points can only be suggested by a series of digressions.

A dictionary states that entomology treats of insects. This would be more correct to-day if put in the past tense. Aristotle pointed out that the bodies of insects were cut up—hence the name of the science. Would the Greeks have changed the name of insects in their language had they foreseen its prophetic significance?

Mr. Herbert Spencer laid down the rule, "That no analytical truths, no combination of analytical truths, can ever make up that synthesis of thought which alone must be the interpretation of the synthesis of things." He fortunately never carried this principle very far towards its logical conclusion, or the world would have missed most of his work. Is it not true, in spite of what has often been said to the contrary, that means are only justified by the end proposed?

What are the ends proposed by entomologists to-day? Are they not many in number, and chaotic in direction, considered collectively? Some must be mutually destructive, judging by the work done in proportion to the results attained.

It might be said that the conspiracy against common ignorance, conducted by the secret societies of entomologists speaking a jargon of their own, is quite harmless, owing to lack of organisation among its members.

If the man in the street so much as knew our society met here to-night, he might ask a well-informed companion, "What do those fellows do?" "Oh, they sit round a table and talk about bugs," the well-informed one could reply. If the question were, "Who was Professor Huxley or Tyndall?" the answer would be "A great scientific man." So much can be learned in their works. Why this difference?

Should an entomological Nordau be born to us in the course of time, he would be a heaven-sent boon. Are there not materials

ready at hand to form a great work on the degeneracy of the science? Take a glance at nomenclature by way of illustration. Degeneracy can be traced both in the man and the succession of men. Linnæus started well. Taken at random, we have *Iris*, *Sibylla*, *Comma*—ideal names. *Tithonus*, *Betulae*, *Ziczac*—pronounceable names. *Derasa* is sweet. *Batis*—you can almost hear those lovely spots dropping on that beautiful ground colour. Take a jump to the Micros—one example is enough—*Swammerdamella*. A little later we have *Swammerdamia*, as a generic name from Hübner, which is an atrocity, besides giving occasion for the vulgar to blaspheme. All idea of the ridiculous is lost. These examples are taken from South's list, and above the last a family name appears, which is too difficult to pronounce, and too long to spell, from Stephens. All idea of utility had fled. After this, for the most part, is a mad riot of type, and if there are two out of the lot who deserve special mention for doing their best to make entomology stink in the nostrils of practical men, they are Zeller and Fischer Edler von Röslerstamm.

Nothing so commonplace as the necessities of the cabinet, or economy in writing and printing ever entered the heads of the workers among the Micros, with one or two exceptions, and that monument of folly, "The Entomologist" Synonymic List, has done its best to perpetuate the iniquitous, *in conformity with the law of priority*. The sooner nonconformity establishes itself the better. We want some nomencluralists, and we want them badly.

Professor Huxley, speaking of technical terms, says, "There are two ways of producing them, one by phrasing, and the other by the invention of new signs," and adds, "the practice of sensible people shows the advantage of the latter course, and here, as elsewhere, science has simply followed and *improved upon* common sense."

On a most cursory examination of entomological literature it appears that the better known the division, the more intricate the present treatment, which seems to be due to the probable excess of leisure possessed by the authors, rather than the special necessity or proportional usefulness of the work. In the less known divisions practical men have some credit left. Is not what is here termed degeneracy owing to the gradual and deplorable disregard of uses? You remember the "Spiritualist," Dickens encountered in America, who informed him of some marvellous communications from the other world. One of great interest was a new rendering of an old proverb, "A bird in the hand is worth two in the bosh." "They meant 'bush,'" said Dickens. After referring to his notes the other replied solemnly, "It came to us 'bosh.'" This kind of person should be sent into the field to observe and collect facts. He can be absolutely trusted not to add any ideas of his own, nor will he try to make bosh plausible.

Professor Huxley defines evolution employed in biology as a general name for the "history of the steps" by which any living being has acquired the morphological and physiological character which distinguishes it. Mr. Herbert Spencer defines it as: "A *change* from an indefinite incoherent homogeneity to a definite coherent heterogeneity through continuous differentiations and integrations. Professor Drummond, in his amusing scaffolding chapter on the "ascent of man," says: "That evolution should leave such clues lying about is,

at least, an instance of its *candour*." This gentleman evidently endows evolution with personal attributes. Deification will no doubt follow shortly. It appears the chief use of authorities is to instruct the common herd, and sooner or later to contradict each other. The certainty of this latter performance is a great and blessed consolation to the same herd, and can always be awaited with patience born of experience.

By way of metaphor, might not evolution be described as a light on our path, by some taken as a Will of the Wisp, caused by the spontaneous combustion of gas thrown off in the decomposition of a great accumulation of heterogeneous facts; while by others taken as a light leading them to a distant home to be reached by a prodigious effort?

Evolution seems to mean, in English, the sequence or order of being or becoming from beginnings. Is knowledge of this sequence attainable even in the future, and further, is its importance commensurate with the work necessary for its acquisition? If the data and materials be examined, it becomes obvious that the corpse and fossils are the enormously predominant factors in such an enquiry. You cannot leave out geology. As to insects, there is, or was till recently, a clean gap, in the Pliocene. In the upper Miocene we have 1,800 species—all Orders are represented, Coleoptera most abundantly, and almost all can be referred to existing European genera.

In the Cretaceous there are two butterflies referable to the SATYRIDÆ; in the Oolite, insects are not uncommon; one species of the Lepidoptera is referable to *Sphina*. A large number of insects are found in the Lias of Gloucestershire, and these again can be referred to well-known family types. These facts are suggestive. How far beyond the Palæozoic epoch must we look for the parent types of each division, letting alone their common parents?

Observation of the living specimens and the data of the immediate past afford quite inadequate materials for even plausible generalisations as to the probable descent of any entity now living, considered in this relation. Anyhow, it is evident that the ideal classification, from the evolutionary point of view, can only be accomplished by each one who is possessed of that ideal leaving his share of facts recorded for others to generalise upon, when the area and period of investigation bear so ridiculously small relative proportion to the area of the globe and the period involved from beginnings.

When will the bulk of the best entomologists turn their attention to uses, secondary perhaps in order of presentation to the mind, but primary in order of importance? The authors, popularly speaking, of the evolutionary theory, Darwin, Huxley, Tyndall, and professors of science generally, did not altogether follow the method detailed above. Had they done so they might never have been heard of outside the small circle of the initiated. They—turning to literature—tried to write popular books, and made a mess of it, as might have been expected, for they were scientists after all. These books, for the most part, are abominably badly written,\* having regard to the alleged end in view, which is generally defeated. Most are more talked about

---

\* We disagree absolutely. Few better writers of the English language than Huxley have existed. He and Tyndall made science largely what it is.—Ed.

than read, and many would have remained in the obscurity they deserved, but for certain circumstances.

The time for the natural history novel had come. The historical novel, which was a very good thing in its way, gave some history and plenty of "novel." Scott or Harrison Ainsworth would have shown the way to reach the public with the natural history novel.\* With these authors, it is their treatment of the subject which charms the reader. With the others, the facts only are interesting to the average man; the plot, so to speak, or the romantic portion, only bores. However, certain men, mis-called theologians, attacked some of the romance, which gave a wholly undeserved and extraneous value to the same. In return, a friendly lead was given to parson-bating, now a very popular thing, for some occult reason. Many scientists gained a passing popularity at the expense of science (without a capital letter), and people took sides on an absolutely false issue.

Most of the books are really more controversial than educational, and to be popular contain far too many facts, which in their authors' opinion bolster up their preconceived notions and theories, which go for little outside their own sects. The fun begins directly they are taken seriously. The popular type of scientific book has yet to be written. The nearest approach to the ideal was made by Mrs. Scott Gatty, in her "Parables from Nature," written for children. What is commended to your notice is the "Psychological climate" of her mind when contemplating nature, and the choice of examples to accomplish her ends. The Rev. J. G. Wood has been fairly successful, but most of his books contain too much classification on the Morse code plan.†

What is wanted is scientific romance, honestly published as such, written by a master of the literary art, with natural history for his stock in trade. Such an one would persuade the average man of what we all know so well: the charm, the beauty and intense delight of it all. Awaken his interest, and he will get facts for himself, and be ready to supply them to societies like our own. When this is done the area of investigation will be greatly enlarged, and sound classification can be begun within one hundred years from that blessed time. To sum up in one word, the only justification for an entomologist is a moral one—that he shares his riches with his fellows. And this brings me to my plea for a new departure.

I want this society to extend the spirit of the objects set forth in its rules, so that it may do something for the man in the street. That, we, and for that matter, all entomologists, should become educationalists as well.

I have noticed among children that the cabinet charms to the extent of a few drawers; interest soon flags, only to be revived by an extra showy specimen. They seldom ask to see the cabinet twice in one visit. Show them a breeding-cage with larvæ in any stage, and they will watch them by the half-hour, return to them when other interests fail, and always revisit the cage every morning to see how the larvæ are getting on. A living imago they will also watch. It is the same with adults in their degree; they always take interest in a breeding cage when they won't look at a cabinet.

\* What would have been the value of such works considered as science?—ED.

† What advance on the present condition of knowledge would our contributor expect from books of this description? Does he not confuse the education of the masses with the advance of knowledge?—ED.



Almost everyone, in my opinion, takes a great interest in natural living objects, and most have a desire to know more about them, but dry-as-dust information as to classification, where they may be captured, or how many segments they can waggle, and when and how they attained comparative rigidity of the same in the pupal stage, etc., does not pass with them as desirable knowledge, but what the things are doing in the world rather.

My ideal entomological society for the City of London would have a town membership of at least 2,000 co-operative members, and 3,000 country corresponding members. To greatly enlarge the present membership the atmosphere at some meetings should suggest a club rather than a funeral, if possible. This society should be housed in a building where members could meet at all times, and where different lines of work could be carried on simultaneously by those collectively interested in any. If human interests were only studied and catered for by the managers of our scientific societies, the membership would be enormously increased, and the funds greatly enlarged without impairing their scientific value. Attached to the house, or associated therewith, there should be a living museum, which should exhibit the metamorphoses of the greatest possible number of species; some species would have to be in glass houses—a kind of small Zoological and Horticultural garden rolled into one. The educational and scientific value of such a museum as I have in mind cannot be exaggerated. If it were well arranged, and a good band were added, the gate money from the public should support it.

An intelligence department should also be organised, with power of initiative vested in the council, or by petition of a given number of members through that body, to call upon all members for desirable information and observations, etc., in the field, from season to season, and a kind of ledger kept, and accounts opened to each species. It occurs to me that a modified form of the British Museum library catalogue would be the best means for registration. Printed proceedings contain a mass of valuable information in a form almost useless for ready reference. In time, most of these could be digested by voluntary work. Thoroughly good manuals, among other things, could soon be produced by this society, and they could be brought up to date from time to time with ease. The usefulness of societies like our own is limited for want of funds at present, and in a wider ideal, and by service of the public. We shall not fail in our reward if we do not falter.

---

## CURRENT NOTES.

Mr. B. A. Bower, F.E.S., Langley, Eltham Road, Lee, is kind enough to offer to any of the readers of the *Entomologist's Record* a copy of a "Label List of the recent additions to the British Lepidoptera," that he has recently had printed for private use, on receipt of an addressed and stamped ( $\frac{1}{2}$ d.) envelope.

Various authors—Schäffer, Van Bemmelen, Urech and Haase—have shown that the order of appearance of the colours in the scales of the pupal wings of Lepidoptera is as follows:—(1) The wings are perfectly transparent. (2) They become pure white. (3) Yellowish. (4) The mature colours develop. Mr. A. G. Mayer, commenting on

this, says that he "has found that the scales develop during the transparent stage. The white stage is caused by the protoplasm shrinking out of the scales, leaving them in the condition of little hollow bags, so that they diffract the light. In the yellow stage the pigment first appears; this pigment is made by something analogous to a blood-clot, for the plasma of the blood enters the scales and forms the pigment. The blood of the chrysalis contains a large amount of serum albumen."

A most interesting paper "On the development of melanism in *Camptogramma bilineata*," by Mr. Kane, appears in the *Irish Nat.* (March, 1896). The form, with the "whole ground colour of the fore-wings, and, in a less degree, that of the hind-wings darkened, closely approximating to suffused specimens described by the late Mr. Jenner Weir, from Unst, but more melanic," is called *ab. infusca*. Another form, "with all the wings of a sooty black, upon which the waved strigæ and median band are marked in a darker tone. . . . the body and underside of the wings also of a sooty black," is called *var. isolata*. The largest of these are said to be 1½ inches in expanse from tip to tip, and this is considered a proof that "the blackening is not a result of dwarfing or diseased conditions." These specimens occur on the cliffs and islands of Cork and Kerry, where the rocks belong either to a dark slate formation or are formed of dark conglomerate. As the herbage is sparse, the insect rests on the dark rocks, and Mr. Kane concludes that the species "has acquired a melanic tendency as a protective adaptation, and that isolation on a small area out at sea (the island being haunted by bats and insectivorous birds, that have thinned out the paler specimens, conspicuous on the dark rocks), has brought about the survival of the more melanic forms." The rainfall of Kerry is, Mr. Kane says, "notorious;" but he thinks that the excessive wet has only been a factor in the total result to the extent that it darkens the rocks. The rocks, too, where they occur, are in winter bathed in spray, the Atlantic waves dashing floods of water high into the air, so that the islet in question must be continuously soaked by the deluge of sea water, as, indeed, Mr. Kane avers it was in the winter of 1893.

At the sale of Mr. Fry's collection on March 9th and 10th:—*Chrysophanus dispar* produced per specimen, 80/-, 65/-, 50/-, 105/-, 126/-, 100/-, 120/-, 90/-, 40/-, 110/-, 84/-, 80/-, 135/-, 105/-; *Pieris daphidice*, per specimen, 12/-, 9/-, 10/-, 8/-; *Euranessa antiopa*, per specimen, 10/-, 12/-, 12/-, 12/-, 7/-; *Nomiades semiargus (acis)*, per pair, 20/- 20/-, 18/-, 14/-; *Deilephila livornica*, 7/- (2 specimens), 10/- and 12/- per specimen; *Choerocampa celeris*, 8/-, 7/- each; *Sesia allantiformis*, 52/6, 32/6, 27/6 per specimen; *Sciapteron tabaniforme*, 40/-; *Lasioampa ilicifolia*, per specimen, 26/-, 22/-, 22/-, 24/-, 21/-, 16/-, whilst one with a larva produced 32/6; *Laelia coenosa*, per pair, 20/-, 22/-, 26/-, 18/-; *Deiopeia pulchella*, per specimen, 18/-, 10/-, 12/-, 21/-, 12/- for 2; the "original *Nyssia lapponaria*, taken by J. Warrington at Loch Rannock, April 4th, 1871," fetched 45/-; *Cleora viduaria*, 30/- for 2, 22/- for 3, 27/6 for 2; a lot consisting of 2 specimens of *Acidalia straminata* *var. circellata* and 2 *Acidalia perochraria* produced 32/6 (the latter not the original specimens of Weston); *Abraaxas grossulariata*, 35/- (9 vars.), 20/- (3 vars.); *P. polygrammata*, 16/- (4 specimens), 18/- (8 specimens), 14/- (8 specimens), 26/- (8 specimens); *Cidaria reticulata*, 16/- (for 3),

14/- (for 3), 18/- (for 3), 21/- (for 3), 12/- (for 2); *Platypteryx harpagula*, 26/- (for 2), 28/- (for 2 with larva); two specimens of *Peronea cristana* ab. *curtisana* produced 42/-; *Eupoeecilia gilvicornana* produced 10/-, 12/-, 9/- per pair; *Cerura bicuspis*, for sets of 3 each, 7/-, 8/-, 10/-, 16/-; *Leucania vitellina*, 13/-, 14/-, 20/-, 14/- per specimen; 1 each of *L. vitellina* and *L. albipuncta*, 8/-; *L. albipuncta*, 12/- (for 2), 4/- (for 1); *Laphygma exigua*—21/- and 10/- each; *Xylomiges conspicillaris*, 12/- and 18/- per pair; *Agrotis subrosea* (1) and *Xylina conformis* (1) produced 14/-; *Crymodes exilis*, 22/-, 18/-, 18/-, 26/-, 24/- per pair; *Hydrilla palustris*, captured by Mr. A. Houghton, 9/- (1), 10/- (2), 10/- (2), 22/- (pair); *Caradrina ambigua* (taken by Mr. Vine) produced 16/-, 16/- and 21/- each; *Pachnobia hyperborea* var. *alpina*, 28/- (for 6); *Dianthoeia luteago* var. *barrettii*, 12/- (for 4), 21/- (for 4), 26/- (for 2), 20/- (for 2), 35/- (for 2), 32/6 (for 2), 30/- (for 2); a fine var. of *Polia xanthomista* (*nigrocincta*), 44/-; *Cucullia gnaphalii* produced 10/-, 8/-, 8/-, 20/-, 21/- per specimen; *Plusia ni* (taken in New Forest by Mr. Grey, 1879), 21/-; *Catocala fraxini*, 30/-, 21/- per specimen; *Catocala electa* (the first British specimen, taken by Mr. A. Vine at Shoreham, 1875), 55/-; *Agrotis subrosea*, 12/-, 10/-, 16/-, 28/-, 126/- (bred), per pair; *Nonagria sparganii*, per pair (from Mr. S. Webb), 22/-, 22/-, 26/-, 32/6.

Our friend Mr. H. Tunaley, F.E.S., of 30, Fairmount Road Brixton Hill, S.W., who is at work on the Lycænids, asks us to insert the following:—"WANTED.—Specimens of any of the LYCÆNINÆ, especially *P. corydon*, for examination. Full data as to locality, etc., should accompany the specimens. If correspondents will kindly forward them by *parcel post*, I will refund all expense, and replace any damage in transit. Any old specimens may be sent so long as the wing structure is perfect." We trust many of our subscribers will be able to oblige him; we need not add that every care will be taken of the specimens sent.

## VARIATION.

ON THE NUMBER OF BRITISH SPECIES OF OPORABIA.—It would appear that the present race of entomologists are not at all satisfied with the condition of our knowledge concerning our Oporabias, and that it would be a good thing if Mr. Prout (who is so specially interested on the LARENTIIDÆ) would bring forward all the information as to the distinctness or otherwise of *Oporabia dilutata* and *O. jiliogrammaria*. The historical facts bearing upon the making of *O. autumnaria* a species and its subsequent reduction to varietal rank, coupled with the present information, for or against either view, would be of the greatest use. On the other hand, there are many well known Rannoch workers—both amateur and professional—who could give information with regard to 1.—Undoubted *O. jiliogrammaria* from the moors. 2.—Undoubted *O. dilutata* from the woods. 3.—The silky insect which is usually considered as *O. jiliogrammaria*, has largely the facies of *O. dilutata*, is not confined to the moors, feeds in the larval stage on willow, and may be specifically separate from either of the now recognised British species. It appears to be this form that is figured in *Ent. Record*, vii., pl. 3.—J. W. TUTT, Westcombe Hill, S.E. March, 1896.

I have taken insects in Scotland as early as August 16th, which I suppose are *O. filigrammaria*, but which, as far as markings go, might be taken for *O. dilutata*; in fact, nothing but a little smaller size, a slight difference in the tone of colour, and the early date, distinguishes them from *O. dilutata*. Mr. Meyrick, I see, lumps all into one species. I have in Scotland only found *O. dilutata* among woods, or where there has been a good many trees. I have not noticed it upon the moors. I have observed *O. filigrammaria* in two localities, both in Argyllshire, and it was not common in either of them. One of these localities was at sea level, close to the sea; the country was bare and there were no trees, only stunted bushes. At the other locality, although there are plenty of woods, I have never seen *O. filigrammaria* in or near the woods, but I have taken it on the moors, miles from trees, and up to 1200 feet above the sea.—W. M. CHRISTY, F.E.S., Watergate. March, 1896.

I am pleased to find attention drawn to *Oporabia dilutata*, as it is a species of which I have examined a great number of specimens in the hope of finding a form which is in a York collection, but which I have never secured for myself. The hind-wings have a dark band round them, and the usual central line. What is *Oporabia autumnaria*? I took, a few years ago, towards the end of August, a specimen of what I at first fancied to be *O. dilutata*, although much smaller. The date of capture, however, was all too early for that species, and I was afterwards told by an old collector that it was *O. autumnaria*. Will someone inform me about this so-called species?—S. WALKER, 23, Portland Street, York. March, 1896.

VARIETIES OF *HYBERNIA DEFOLIARIA*.—We used to get all the varieties of *Hybernia defoliaria* at Redhill, but, of course, the banded ones were in a large minority, and not nearly so finely contrasted as the Yorkshire and Lancashire specimens. The rarest variety appeared to be one of these banded forms, that looked as though it had been dipped in an umber bath and then sprinkled over with dots—a curious admixture of three races.—SYDNEY WEBB, Dover. March, 1896.

## NOTES ON LIFE-HISTORIES, LARVÆ, &c.

HABIT OF THE LARVA OF *BOARMIA ROBORARIA* IN SPRING IN NATURE.—With regard to the notes on this subject (*ante.*, pp. 280-281), I have frequently obtained larvæ of *B. roboraria* from oaks when I have been beating for larvæ of *Cleora licheneria*, in February and early March, before the oaks have shown a sign of leaf. They must therefore have loosened their winter hold of the branches before they could expect to get nourishment from the buds, but larvæ do attack buds surprisingly early, before the human eye can detect much sign of growth. It may not be out of place to remark that larvæ of *B. roboraria* feed on sallow and whitethorn, besides oak and birch. I have often beaten them out of both, and generally feed mine up on sallow.—J. C. MOBERLY, M.A., F.E.S., 9, Rockstone Place, Southampton.

EXTENDED PUPAL STATE OF *NYSSIA ZONARIA*.—Is it generally known that this insect "holds over" in the pupal stage? In April, 1894, from ova obtained from St. Anne's-on-Sea, I successfully reared about

thirty larvæ which eventually pupated at the end of July. On March 31st, 1895, a female emerged, and, after living more than three weeks, disappeared; not a single other imago accompanied her. Thinking that the whole brood was dead I happened, last October, to turn up one of the pupæ out of the sand in which they were lying, and on opening it was surprised to find a male in a state of extreme liveliness. It never developed, but lived some days. I have kept the cage undisturbed, and a few days since another male—a cripple—came out, the period from the laying of the egg to the last stage being thus completed in a month under the two years.—H. ROWLAND BROWN, M.A., F.E.S., Harrow-Weald. *March 11th, 1896.*

HYBERNATING LARVÆ.—I would recommend those lepidopterists who have not tried to hibernate larvæ on the common garden marigold, to give it a trial. It is far easier to grow in a pot indoors than most other plants. Larvæ of *Aplecta herbida* and many other species appear to thrive on it.—F. NORGATE, 98, Queen's Road, Bury St. Edmunds. *March, 1896.*

## NOTES ON COLLECTING, &c.

SPRING NOTES.—The season seems very early. Two or three salallows are in full bloom, and last night (March 11th), I visited them for the first time, getting *Taeniocampa munda* (2), *T. gothica* (3), *T. stabilis* and *T. pulverulenta* in numbers, both males and females, *Orrhodia vaccini* and *Scopelosoma satellitia*, several of each, and *Xylina socia* (1). I also took, yesterday morning, from my traps—*Amphidasys strataria* (3 males), *Asphalia flavicornis* (♂), *Taeniocampa gothica* (♂), *T. pulverulenta* (several), *Nyssia hispidaria* (♂), *Xylocampa areola* (2), *Hybernia rupicaprararia*, *H. marginaria*, *Larentia multistriparia* (3 males), *Leptogramma literana*, and crowds of *Tortricodes hyemana*. This will give some idea of what my traps are doing now on good nights, i.e., since the moon was right about a week ago.

I have noted the following first appearances this year:—*Hybernia rupicaprararia*, Jan. 18th; *Taeniocampa stabilis*, bred Jan. 19th, at light, March 11th; *Phigalia pedaria*, bred Jan. 24th, ♂ at light, Feb. 7th; *T. instabilis*, bred Jan. 26th, not yet seen at large; *Tortricodes hyemana*, Jan. 25th; *T. pulverulenta*, bred Jan. 26th, at light, March 8th; *T. gothica*, bred Feb. 1st, at light, March 10th; *Hybernia leucophaearia*, Jan. 18th; *H. marginaria*, Feb. 7th; *Eupithecia abbreviata*, bred Feb. 11th, at light, March 6th; *T. munda*, bred Feb. 8th, at light, March 8th; *Nyssia hispidaria*, Feb. 12th; *Asphalia flavicornis*, March 7th; *Amphidasys strataria*, March 7th; *Larentia multistriparia*, Feb. 16th; *Brotolomia meticulosa*, bred Feb. 1st; *Anisopteryx aescularia*, March 7th; *Xylina areola*, March 10th; *Eupithecia punctilata*, March 12th; *Tephrosia crepuscularia*, March 12th; *Selenia bilunaria*, March 9th. The traps were not set from February 20th to March 6th, so the first appearances noted on March 6th–8th, are probably not so really, e.g., *A. aescularia* was well out on the 7th, eleven being in one trap. *Hybernia leucophaearia* has been very scarce this season.—E. F. STUDD, M.A., B.C.L., F.E.S., Oxtou, Exeter. *March 12th, 1896.*

REFLECTIONS AND QUERIES ON THE VALUE OF RARE BRITISH LEPIDOPTERA.—The following insects, sold as a part of Mr. C. E. Fry's

collection, should, in the interest of our study, and so that we should know our British fauna, have some light thrown on them. It would be interesting, too, to know whether the buyers will put them into their collections as British, and if so, on what ground. *ACIDALIA HERBARIATA*, "taken by Mr. Hutchinson." Six of these were sold in Lots 101, 102, 108, two specimens in each. There are no recorded British ones, except a pair by Meek, and Coverdale's specimens in Mr. Tutt's collection. Where did Mr. Hutchinson take them? *LYTHRIA PURPURARIA*, "taken by Button, Gravesend":—Lots 109, 110, and 111, consisted of 8 specimens each, and the 9 went for 9s. It is well-known that there is not a single *bona fide* British specimen extant. *STEREHA SACCARIA*. No data. Lots 112, 113, 114, 115, consisted of 2 specimens each. The 8 were bought by Mr. J. B. Hodgkinson for 8s. *APLASTA ONONARIA*, taken at Folkestone, August 3rd, 1877, by C. Bailey," 20s. Is this Mr. Bailey, of Dover? If so, I remember an interesting conversation with him in 1881, *re Acontia albicollis* and some other rare insects which he had captured. *ACIDALIA PEROCHRARIA*. No data whatever. One specimen in Lot 104 and 2 in Lot 105. There are, presumably, only Weston's two, supposed to be British. Are these Weston's? If not, whose are they? *SYNIA MUSCULOSA*:—Lot 819, "2 from Wilkinson's collection." Lot 820, "1 very fine, taken at Bexhill, August, 1877, by Mr. G. Bristow." Lot 821, "Ditto"—evidently another by Mr. Bristow. Who is Mr. G. Bristow? Is he a known lepidopterist? Has any living entomologist ever seen a living specimen of *S. musculosa* in Britain? *PACHETRA LEUCOPHÆA*.—Lot 840, 2 specimens, no data, went with 48 other moths for 3s. Lot 846, 4 specimens, went with 81 other moths for 4s. Lot 864, 2 specimens, went with 68 other moths for 5s. *HADENA PEREGRINA*, "taken at Lewes, 1870, by Miss M. Meek, *ex* Curzon's collection." This was sold for 12s. I believe there are two known British specimens, which Bond had. If this specimen of *H. peregrina* was really considered to be British, it should have produced £5 at least. If not, why did it fetch 12s.? *ORRHODIA ERYTHROCEPHALA*.—No data. Lot 878, 1 specimen, and Lot 879, 1 specimen, produced 6s. and 8s. respectively. *DIANTHOECIA COMPTA*.—Lot 887, "1 taken by E. G. Meek, 1869 or 1870," produced 5s. This is interesting in the face of the recent discussion and Mr. C. G. Barrett's statement at the South London Entomological Society. *XYLINA LAMBDA* (ZINCKENII).—Lot 421, "1 specimen, taken at Ranworth by W. Clare, Sept., 1877." Lot 422, "Ditto." This, I take it, means that Mr. Clare took two specimens at Ranworth in 1877. Are these two of the specimens mentioned *Ent. Record*, vol. vii., pp. 126-127? If not, why were they not recorded? If so, are they not worth more than 12s. apiece? *ACONTIA SOLARIS* and *THALPOCHARIS OSTRINA*. Lot 488, 2 *T. ostrina*. Lot 489, 1 *A. solaris*. Some one gave 8s., it appears, for these three specimens; will they go into a "British" collection? *OPHIODES LUNARIS*.—There are the following recorded British specimens:—*Ent. Ann.*, 1855, p. 16; *Int.*, viii., p. 91 (*Zool.*, 7108); Newman's *British Moths*, p. 468 (two, Bouchard at Killarney). Who has these two specimens? *Entom.*, vii., p. 164; *Entom.*, viii., p. 164; *Ent. Rec.*, iii., p. 132. The three specimens sold are most certainly none of the recorded individuals, and appear to have gone straight from dealers' hands to Mr.

Fry. Lot 450, "*Lunaris*, fine, taken by Mr. Bristow, Horsebridge, Sussex, June 4th, 1877." I would call attention to my previous remark on *Synia musculosa*. This (1877) must have been an excellent year in Sussex. The specimen fetched 20s. Lot 451, "*Lunaris*, taken by T. Salvage on the Brighton racecourse, June, 1877." Why has Mr. Salvage never recorded this? It fetched 68s. Lot 452, "A grand *lunaris* ♀, taken by Mr. Dale, Polegate, May, 1880." This specimen produced 40s. Now, I venture to state that this specimen is such a marvellous aberration that there is scarcely another like it in Europe. Yet it produced but 40s.; whilst Lot 453, also caught by Mr. Dale, and from the "ditto," evidently at the same time and place, was bought by Mr. J. B. Hodgkinson for 35s. Lot 475 contained 2 *DRASEMIA RAMBURIALIS*, without data. These, with 215 other moths, were also bought by Mr. J. B. Hodgkinson for 18s. Lot 477 and 478 contained *EBULEA CATALAUNALIS* and *MARGARODES UNIONALIS*, which, with 34 other insects, went for 12s.; whilst a *MECYNIA POLYGONALIS*, "Warren's collection, very fine," went, with 215 other specimens, for 16s. I would ask entomologists to compare these with the prices fetched by the same species in Mr. Tugwell's collection, and I should like to know the real ground upon which *D. ramburialis* and *E. catalaunalis* are considered British at all. I will only draw attention to one other notable lot, viz., Lot 275, which contained "*Niobe*, 2; *lathonia*, 2; *erythrocephala*, 2; *zinckenii*, 1, and box from Parry, Canterbury." Evidently these are just as Parry sent them to Mr. Fry, and these give an excellent idea of how easily even a box full, so to speak, of reputed British specimens find purchasers. The buyer at the sale paid 18s. for this lot, i.e., 2s. 7d. each. Evidently, therefore, he considered them British, for the average price of Continental specimens is:—*A. niobe*, 3d.; *A. lathonia*, 1½d.; *O. erythrocephala*, 2½d.; *X. zinckenii*, 6d. I am most anxious not to prejudice the sale and reputed captures of any *bona-fide* British species, and only trust that some of the above queries will clear up the British authenticity of many of the insects mentioned, and to which I have drawn attention.—JOHN BULL, London.

*BROTOLOMIA METICULOSA* DOUBLE-BROODED.—I see, according to Newman, that *B. meticulosa* is single-brooded, the autumn larvæ hibernating and producing the imagines of the following autumn. I have repeatedly taken this species in spring, and last December collected a large number of larvæ, all of which pupated in a short time, and have all emerged in my breeding cage during February and March. No doubt this insect is well-known to be double-brooded.—E. F. STUND, M.A., B.C.L., F.E.S., Oxtou. March, 1896.

FOOD-PLANT OF *POECILOCAMPA POPULI*.—It may be of interest to note that on December 4th, 1893, a female *P. populi* gave me a batch of eggs, which hatched from February 3rd—14th, 1894. I tried them with various foods then procurable, and at last found that they would eat lettuce, on which I bred them right through. They spun up in April, and the imagines appeared in November, 1894.—IBID.

EARLY SPRING NOTES.—After no winter to speak of, the spring opens here with the calendar. *Brephos* was flying on the 15th. On the 18th, *Polyphloea flavicornis* appeared in numbers. I have taken over 40 specimens in two mornings, among them some pretty aberrations.—A. R. GROTE, M.A., Hildesheim. March 21st, 1896.

## SOCIETIES.

THE NORTH LONDON NATURAL HISTORY SOCIETY met on February 27th, when Mr. Prout exhibited specimens of, and read the following NOTES ON MELANIPPE SOCIATA.—“These specimens will illustrate some notes which I am publishing in the *Entomologist's Record* (ante, p. 249. Ed.). They are representatives of three broods which I have bred from ova obtained at Sandown; broods B and C, I regard as normal forms; in brood A, on the other hand, none are entirely normal, the majority of them having pale basal area and hind-wings, while the remainder (six specimens) are the ab. *cingulata* of Tengström, with dark abdomen, basal area, and hind-wings.” Mr. Bacot exhibited broods of *Ennomos quercinaria*, *Amphidasys strataria*, *Selenia tetralunaria*, and read the following NOTES BEARING ON HEREDITY exhibited by the specimens :—“As regards *E. quercinaria*, the parents were taken in cop., in Clapham Road, August, 1894. The ♂s bred show a considerable range of variation, both as regards richness, depth of ground-colour, and in the suffusion of the fore-wings. The first 8 have very slight, if any, traces of suffusion; the remaining 15 of the row have it well marked, though not so strongly as in the father; while the next row of 23 approach the ♂ parent closely, but only one specimen is noticeably darker. The ♀s are naturally more pallid than the ♂s, but a few show a tendency to the richer coloration of the ♂ parent. The first 16 have hardly a trace of suffusion, the next 20 or 30 range from nearly as dark to rather darker than the mother, the remainder are much darker, in one or two instances closely approaching the ♂ parent. The greater part of the brood of *A. strataria* died in the pupal stage. Those that emerged closely followed the parent form. As regards *S. tetralunaria*, the species is, of course, dimorphic, presenting a well-marked difference between the spring and summer forms. The specimens of this species exhibited, include the broods of 5 generations. The first parents were a dark ♀ and a very light ♂, both of the spring form. One ♂ in the second brood showed a decided tendency to follow its father in coloration. Brood No. 3 was expected to produce some light forms, but these showed a marked tendency to follow the ♀ grandparent rather than the ♂. At this point the brood was practically spoiled from an experimental point of view, as, to keep the stock from deteriorating, fresh blood was introduced by crossing with a captured ♂, 87 specimens bred from half the ova resulting from this cross-formed brood No. 4. There was a tolerable range of colour in this brood, but nothing calling for special remark. Special attention, however, should be given to the ♂ parent of brood No. 5, the markings of which are blurred and indistinct, and the colours more or less suffused. There were very few fertile eggs laid by the ♀ of this brood (not more than 12). Two moths bred from these eggs emerged last autumn, the remaining pupæ are awaiting the spring. It is worthy of notice that both these specimens are of the summer form, although they emerged from autumn pupæ, which normally produce the spring form, and also, that neither of them showed the slightest tendency to follow the ♂ as regards the blurred and indistinct wing markings.” Mr. Nicholson: three generations of *Ennomos quercinaria*. The specimens show the gradual development of a dark cloud exterior to the outer transverse line on the fore-wing,



and between the inner line and the base of the wing. One male specimen in the 3rd generation was suffused deeply over almost the whole of the fore-wing.—On March 12th Mr. L. J. Tremayne drew attention to an article by Mr. Tutt in the February number of the *Entomologist's Record*, on the nomenclature of the LYCÆNINÆ. Assuming Mr. Tutt to be correct, he rather agreed with his view, that it was high time that naturalists should take to naming this family correctly, and he suggested that the Society, which is at present bound by South's List, should consider the advisability of revising its nomenclature. Mr. C. Nicholson opened a discussion on "THE AMPHIPYRIDÆ." He illustrated his remarks with specimens of the family, including *Mania maura* and var. *virgata* from Hale End. He also exhibited a pair of the wings of each species denuded of their scales, in order to show the neurulation, and some explanatory drawings. He explained the nomenclature of the family, and proceeded to deal with the species in all their stages. He alluded to the neurulation of the imagines, and said that *Mania maura* had an extra nervure. He also touched on the various classifications of the family by different authors. Mr. Prout disapproved of the genus *Amphipyra*, the species of which he thought were certainly generically distinct. Mr. Bacot stated that the larva of *A. pyramidea* was a looper when it first left the egg-shell.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—March 3rd, 1896.—Exhibits:—Mr. Frost: two specimens of *Cymatophora ocularis*, taken in 1893; he had not seen the species in the same locality since. Mr. Tutt said the most likely way to obtain this insect was to search for the pupæ in the angles at the roots of poplars, wherever the species was known to occur. Mr. J. A. Clark: a short series of *Nyssia hispidaria*, bred between February 17th and 22nd, from New Forest larvæ; all the specimens were more or less light in coloration. Mr. Pearse: an absolutely black male of the same species, which he had taken at Epping Forest with 11 others; one of these was a black female, the rest being normal. Mr. Sauzé: a specimen of *Melanippe rivata* from Deal, having the broad white fascia on the fore-wings bisected throughout its length by a distinct dark line, which was faintly continued in the corresponding white band on the hind-wings. Mr. May said he had found that, if well shaken up in a pill-box, male *Nyssia hispidaria* expanded their wings, although they had been out of the pupa for some hours without showing the least sign of the usual expansion. Other members mentioned instances of lepidoptera having duly expanded after remaining unexpanded an unreasonable time since their emergence from pupa. Mr. Tutt said that lepidoptera (*Vanessa urticae* in particular) might be removed from their pupa-shells some hours before they were due to emerge, and, if the thin membrane swathing the various parts had been carefully removed, they would wait till they were matured, and then the wings would expand as usual.

March 17th, 1896.—Exhibits:—Mr. Nicholson exhibited a simple piece of APPARATUS FOR TAKING INSECTS OFF GAS-LAMPS without climbing them. It consisted of an oblong tin box, fitted with a glass front, a ferrule at the bottom, into which a stick can be placed. The back of the box slides up and down, being worked by a spring. In working the apparatus the back is pulled down by a string held in the hand, the open back of the box is placed over the moth on the lamp, the string is allowed to go, and the back closes rapidly with a click. The members

considered that many of the specimens would most likely be cut in pieces with the upsliding back. Mr. Heasler exhibited a beautiful specimen of *Phorodesna pustulata*, which he had found when freshly emerged at Hendon, the empty pupa-case being near; also two *Aventia flexula* from the New Forest. Mr. Tutt called attention to the unsatisfactory state of our knowledge with regard to THE AFFINITIES OF AVENTIA FLEXULA. He pointed out that Stainton included it among the GEOMETRIDES. Newman did not include it in his book at all, so that he evidently considered that its affinities were not with any of the super-families he described as comprising the Macro-Lepidoptera. Some authorities give it a position in close proximity to the DELTOIDES, treating it as a distinct family. The peculiar larval structure suggested that its affinities were rather with the Catocalids, and most recent authors are agreed as to this. He remarked that, in a recent paper,\* Prof. Grote places this genus in the *Boletobiini*, a tribe of the Catocaline moths, and writes:—"The suppression of the prolegs in the *Catocalinae*, especially in the *Boletobiini*, where it reaches its maximum in *Boletobia* and *Aventia*, would seem to be of phylogenetic importance." He reminded the members, however, that Mr. Tugwell considered† the larva of *Boletobia fuliginaria* a true Geometrid, but as he troubled little about structural peculiarities, his opinion may not be worth much, and although Mr. Tutt saw the larva that Mr. Tugwell reared, he carried no remembrance of it sufficiently definite to be of service. Mr. Heasler also showed a specimen of *Geometra papilionaria*, captured about 9.30 p.m., at Polegate. In a discussion which ensued it was elicited that the species is on the wing, as a rule, from 9 p.m. until very late, and that it frequently came freely to light, but always at a late hour. Mr. May stated that *Asphalia flavicornis* was not nearly so abundant at Wimbledon Common this spring as it had been last year, and that most of the specimens he had seen were very worn.

Mr. R. W. Robbins read a most interesting and instructive paper on "Ferns." In the discussion which ensued the destruction of localities both for ferns and lepidoptera by professional collectors was very warmly debated, the number of well-known localities which have been practically destroyed of late years being almost incredible.

At the meeting of the ENTOMOLOGICAL SOCIETY OF LONDON, held on March 4th, 1896, Mr. Percy H. Grimshaw exhibited specimens of *Cephenomyia rufibarbis*, Meigen, a NEW BRITISH BOT-FLY parasitic on the Red Deer. He said that the specimens were collected by Mr. L. W. Hinxman, in Ross-shire, in June and July, 1894, and in the Cairngorm Mountains, in 1895. Mr. C. G. Barrett exhibited, for Mr. Porritt, a black variety of *Polia flavicincta*, taken at sugar in his garden at Huddersfield; a variety of *Cosmia trapezina* with a blue-black central band; and a variety of *Naenia typica*, with pinkish-white central markings, bred by Mr. Tunstall, of Huddersfield. Mr. A. H. Jones exhibited specimens of the following butterflies captured at Coomassie by Major Henry P. Northcott during the recent expedition, viz., *Papilio zenobia*, *Elymnia bammakoo*, *Limnas alcippus*, *Romaleosoma gauisope* (var.), *Catuna coenobita*, *Terias ceylensis*, and *Neptes nemetes*. Sir John T. D. Llewelyn, Bart., M.P., exhibited a small species of the Diptera, which he believed to be parasitic, on *Sesia sphegiforme*, as he had bred a number from that species. He remarked that *S. sphegiforme*,

\*"The Hypenoid Moths and Allied Groups," *Proc. Amer. Phil. Soc.*, xxxiv., pp. 421-2.

† *Entom.*, xvii., p. 155.

although one of the most local and rarest moths in this country, had occurred last year on the estate of Sir James Hilles-Johnes, K.C.B., at Dolau Cothy, Carmarthenshire, in such numbers in the larval state as almost to destroy the whole of the alders growing there. Mr. G. H. Verrall said that the insects belonged to a species of *Phora*, possibly *Phora rufipes*, which fed on almost everything, but were not considered to be truly parasitic; they seemed blacker than typical specimens of that species. Mr. Hampson exhibited an exotic species of Locustidæ which Lord Walsingham had found in his conservatory at Merton Hall, Norfolk. He stated that Lord Walsingham had not imported any exotic plants for some years. Dr. Sharp exhibited specimens of the PUPÆ OF MICROPTERYX (probably *M. semipurpurella*) and drawings to illustrate their structure. The pupæ were sent to him by Dr. Chapman, who had described their peculiarities in the Transactions of the Society in 1893. Dr. Sharp considered the pupa to be that of a Trichopterous insect; most of its structures were those of Trichoptera, and the account given by Dr. Chapman of its emergence showed that this was essentially the same as that of Trichoptera. He remarked that the imago of this division of *Micropteryx* had been already shown to approach Trichoptera in several respects, and suggested that it should be treated as a group of Trichoptera whose larvæ are not aquatic in habits. If this course were not adopted he felt clear that Trichoptera could not be maintained distinct as an Order from Lepidoptera. He remarked on the peculiar projection from the head of the pupa of *Micropteryx*, and suggested that it might be comparable with the head-vesicle of the nymph, or primary pupa, of Lepidoptera. He also called attention to the importance, for a classification of Lepidoptera, of obtaining a full knowledge of the structure and life-history of *Eriocephala calthella*. Mr. McLachlan said that so long ago as 1865 he had suggested the close affinity of *Micropteryx* to the Trichoptera; the opinion then formed had since been much strengthened, but he was not disposed to admit co-ordinal relationship. Mr. Hampson, Mr. Barrett and Mr. Blandford also took part in the discussion which ensued. Mr. McLachlan exhibited a singular instance of MONSTROSITY IN A DRAGON-FLY. The insect was a male of *Heterorina occisa*, Hag., from Venezuela. On the left side were three wings, two mesothoracic. The supplementary wing on the left side was inserted almost immediately beneath the ordinary wing; it was normal in form and neurulation, but the red pigment at the base (fully developed in all the other wings) was not evident, the wing in this respect being similar to those of highly immature examples of the same species. Mr. E. E. Green exhibited a LARVA OF A HOMOPTEROUS INSECT—one of the *Cicadinae*—from Ceylon, having what appeared to be a head at its caudal extremity. He pointed out that the larva had caudal appendages which might be mistaken for hairy antennæ, and pigment spots resembling eyes on the antepenultimate segment of the body. The insect walked either backwards or forwards, and when first seen looked like a beetle of some kind, the caudal extremity representing the head.—On March 18th, 1896, Mr. C. G. Barrett exhibited a series of drawings of varieties of British lepidoptera in the collection of Mr. S. J. Capper, of Huyton Park, Liverpool. The drawings were executed by Mr. S. L. Mosley, of Huddersfield, and comprised 389 figures, representing 139 species, of which 33 were butterflies and 50 moths. Herr Jacoby enquired whether any record had been kept of

the localities in which these varieties had been caught, or of the conditions under which they had been bred. Mr. Barrett in reply stated that none of the varieties exhibited had been obtained by breeding under artificial conditions for the purposes of experiment. Mr. Porritt added that Mr. Capper had made a special collection of the Yorkshire forms of *Spilosoma lubricipeda*. Mr. J. J. Walker, R.N., exhibited a specimen of *Procas armillatus*, taken on Durland Hill, near Chatham, during the present month. Herr Jacoby exhibited a specimen of *Loxoprosopus ceramboides*, Guér., from Brazil. Mr. E. E. Green exhibited the eggs of some species of LOCUSTINÆ extracted from the stem of a young Cinchona tree at Punduloya, Ceylon. He said the species of the parent insect was undetermined; it was possibly either a *Cymatomea* or a *Cyrtophyllus*, both of which possess large sabre-shaped ovipositors. A slit half an inch deep and more than two inches long had been cut into the hard wood, in which the eggs had been symmetrically deposited, edge to edge, with the coloured part inwards. The greater part of each egg was of fine texture, and coloured green; but at the extremity from which the young insect would make its exit the egg shell was soft, pliant, and beautifully reticulated. The row of flattened green eggs lying side by side resemble an acacia leaf, but as they are concealed within the stem the resemblance was apparently without motive. It seemed curious that as the eggs were embedded they should be brightly coloured. Mr. Green read a short paper entitled NOTES ON DYSCRITINA LONGISETOSA, WESTW. He remarked that drawings of the species had been exhibited by him at a recent meeting of the Society. Dr. Sharp said Mr. Green seemed to think that the insect was an earwig, but he could not accept it as belonging to the Forficulidæ. He thought that further specimens for examination were required before attempting to determine its position, which was quite doubtful at present.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY met on March 12th, when Colonel Partridge exhibited bred specimens of *Phigalia pediaia*, from Epping, of an unicolorous grey colour with dark-coloured nervures; a specimen of *Agrotis puta*, having alternate dark and pale bars; and the specimen of *Hadena albifusa*, taken by him at Portland, August 15th, 1888. Mr. South: bred specimens of *P. pediaia*, from a black female taken at Macclesfield. The males were of the same form as those exhibited by Colonel Partridge, but most of the females were black. Mr. Frohawk: bred male and female of *Nyssia lapponaria*, the ova having been obtained from Mr. Christy. The female was alive. Mr. West, of Greenwich, a female *N. hispidaria*, taken in West Wickham woods.

## REVIEWS AND NOTICES OF BOOKS.

FAUNE DE FRANCE—Coléoptères. — [Par. A. Aclogue, 466 pp., 1,052 figures. — Published by Ballière and Co., Paris, Price 5s.] — It has often been said that scientific books are dear, but this charge cannot be brought against the present volume, which is really a marvel of cheapness. Printed in a small but clear type, on good paper, with figures of nearly every genus and sub-genus, as well as numerous structural drawings, it is no wonder that M. Edmond Perrier refers to it in his preface in such strongly eulogistic terms. The work consists of a preliminary treatise on the external and internal structure of insects generally, with explanatory diagrams on every page, in itself a

valuable feature. This is followed by a brief description of the whole of the French Coleoptera, in the form of dichotomous tables. To these are generally added the sizes of the insects, their geographical distribution and habitat. It is to be regretted that the information on these last three points is too often omitted (e.g., *Chrysomela*, &c.). Mons. Aclogue states in his introduction that he has admitted only well defined species, with distinctly marked characters, and that if he has united under the same name types really distinct, he considers it a less grave error than the minute sub-division of species now so prevalent, and in his opinion so fatal to the progress of natural science. It is to this cause that the British student must attribute the fact that many insects which are familiar to us in our lists, and which are also French species, have no place in this work. Some, it is true, are inserted in italics as sub-species, but others have altogether disappeared. One instance will suffice: Bedel recognises five species of *Laccobius*, here we have but one, i.e., *L. minutus*. It is a pity that all species recognised as such by men like Bedel, Reitter, etc., were not at least inserted in italics as sub-species, as the student is often quite in the dark as to the species with which the author has considered them identical. It must be admitted that for the larger and more difficult genera the dichotomous system alone is of no use to the tyro, and little better than a sort of dictionary to the advanced student. In the genus *Homalota*, for instance, taken in its larger sense, even if it were possible to arrive at a correct determination of an insect by means of tables, the student could never feel sure of his correctness. The fact is, one wants all the confirmation afforded by the relative size of the antennal joints, as well as the sexual characters—so important in this genus—to arrive at anything like reasonable certainty. Tables, however, are not to be despised, and Canon Fowler's work is marred in the genera *Homalota*, *Oxyypoda* and *Myllaena* by their omission. Our author is well aware of the shortcomings of the dichotomous system, and says as much in his introduction. It is, however, the only one that can be used in a work of this kind. Its great fault is that the student is called upon to decide, without any collateral aid, point after point of the greatest nicety; the slightest error leading him completely astray. This is no disparagement of the book, however, for the author has really done wonders with the means at his command. It is only necessary to cite the difficult genus *Cryptophagus*, in which he has discarded the old and useless sub-division by means of the basal fold and callosities of the thorax, in favour of one based on the pubescence, to show how good is the work done. The want of an index to the genera is an omission which must be rectified in any future editions; and sufficient care has not been taken to give correctly the line representing the size in the figures, *Cicindela gothica* being represented as larger than *Nebria complanata*. This is but one instance among many. There is also no gain in giving this line only half its real dimensions. It could have been done in the few necessary cases, and so marked. In giving figures of structural details in the tables of families, etc., as they arise, an immense stride has been made. More still might be done in this way. But no work on the subject ought to be published in future without them. In conclusion, we can only regret that we have no work of the kind in English. In the meantime, no student of British Coleoptera should neglect to procure this admirable work.

# CONTENTS OF VOLUME VII.

	PAGE
CURRENT NOTES...	11, 40, 60, 114, 144, 189, 201, 236, 259, 276, 312
NOTES ON COLLECTING ...	13, 42, 61, 86, 112, 151, 182, 204, 233, 257, 278, 310
NOTES ON LIFE-HISTORIES, LARVÆ, ETC. ...	45, 63, 84, 113, 163, 186, 315 206, 235, 258, 280
NOTES OF THE SEASON ...	43, 64, 87, 112, 158, 184
PRACTICAL HINTS ...	187, 202, 277
REVIEWS AND NOTICES OF BOOKS	17, 48, 71, 95, 116, 163, 211, 240, 256, 285, 323
SCIENTIFIC NOTES AND OBSERVATIONS	42, 56, 81, 109, 145, 179, 197, 254, 278
SOCIETIES ...	21, 46, 67, 95, 118, 129, 164, 191, 208, 237, 259, 281, 319
VARIATION ...	12, 40, 61, 111, 143, 201, 231, 256, 281, 314
Aberration, Strange, of <i>Chrysophanus phloeas</i> ...	112
Aberrations of British Lepidoptera (with plate) ...	217
Abundance of <i>Acherontia atropos</i> , 175; <i>Dioryctria abietella</i> , 176; <i>Emmelesia taeniata</i> , 176; <i>Eupithecia jasioneata</i> , 176; <i>Nonagria cannae</i> , 175; <i>Pachetra lucophaea</i> , 175; <i>Plusia moneta</i> , 175; <i>Sesia spegiformis</i> , 321; <i>Sphinx convolvuli</i> , 175; <i>Viminia albovenosa</i> ...	175
<i>Acherontia atropos</i> , at Clevedon, 155; at St. Agnes, Scilly, 166; in Essex, 114; in Glamorgan, 166; in Glasgow, 204; in Somerset, 112; in Staffordshire	112
<i>Acherontia atropos</i> , How to succeed in rearing, 86; Larva of (type and variety), at Chichester ...	40
<i>Acidalia aversata</i> and its ab. <i>spoliata</i> ...	202
<i>Acidalia dilutaria</i> , Identification of ( <i>vide</i> also <i>A. holosericata</i> ) ...	124
<i>Acidalia holosericata</i> , Dup.= <i>A. dilutaria</i> , Hb., 124; as a British insect, 193; Larva of ...	258
Additions to the British List:— <i>Argyresthia atmorella</i> ( <i>atmoriella</i> ), 200; <i>Bembidium virens</i> , 115; <i>Cephenomyia rufibarbis</i> , 11, 321; <i>Chionaspis aspidistree</i> , 276; <i>Epuraea nana</i> , 201; <i>Icerya aegyptiaca</i> , 276; <i>Lecanopsis brevicornis</i> , 276; <i>Melanostoma barbifrons</i> , 12; <i>Mesogona acetosellae</i> , 129, 175; <i>Ochthebius lejolisi</i> , 41; <i>Periplaneta australasiae</i> , 192; <i>Solenobia wöcklii</i> , 69; <i>Sphecodes rubicundus</i> , 145; <i>Tinea vinculella</i> ...	176
Æstivation, Resting habits of insects as exhibited in phenomena of, ...	1, 52, 243
Affinities of <i>Demas coryli</i> , On the, 224; of <i>Aventia flexula</i> ...	321
<i>Agriopsis aprilina</i> and <i>Euchelia jacobaeae</i> in Perthshire ...	205
<i>Agrotis candellarum</i> ( <i>ashworthii</i> ): How should larvæ of be hybernated? ...	85
<i>Agrotis lucerneæ</i> , not an insect that comes to sugar ...	233
<i>Alucita</i> ( <i>Orneodes</i> ) <i>hexadactyla</i> , chiefly in relation to the structure of the pupæ, On ...	268
<i>Amphidasys betularia</i> , Notes on ...	27, 181
Amphipyridæ, The ...	320
Angularity of the hind-wings of certain Lyceæids... ..	192
<i>Antheraea mylitta</i> , Note on ...	59
Ants using their larvæ to spin webs for their nests ...	282
<i>Apamea ophiogramma</i> , How to obtain larvæ of ...	63
<i>Apateia</i> , Generic names in ...	57
Apparatus for taking insects from lamps ...	320
Argynnids, The variation of ...	283
<i>Argyresthia atmoriella</i> from Kent ...	282
<i>Argyresthia illuminatella</i> and <i>A. atmorella</i> ... ..	200
Aspects of hibernation, Some ...	169
<i>Asteroscopus sphinx</i> , 234; at light, Abundance of ...	157
<i>Asychna aeratella</i> two years in the larval state ...	276
Autumn-bred <i>Colias edusa</i> ...	192
Autumnal captures ...	205
Autumnal emergence of <i>Noctua confusa</i> ...	155
Basket Caterpillar and Bagworm, The ...	121
Bee-hawk moths, Nomenclature of ...	276
Black larvæ of <i>Abraæa grossulariata</i> ...	257
<i>Boarmia consortaria</i> , Larva of ...	61
Bombycides, What are the? ...	277
<i>Bombyx rubi</i> , Eggs of, ichneumoned, 42; How to breed ...	63

	PAGE
Breeding <i>Peridroma sancia</i> , 285; <i>Plusia bractea</i> , 204; <i>Sesia sphegiformis</i> , 208; <i>Sphinx convolvuli</i> (with some account of its larva) ... ..	226
<i>Brotolonia meticulosa</i> , double-brooded ... ..	318
Butterflies from Coomassie ... ..	321
Butterflies in 1895 ... ..	174
<i>Calamnia lutosa</i> , its variation, habits, etc. ... ..	270
<i>Callinorpha herc</i> , 97; Abundance of, in 1895, 175; Breeding of 163, 175, 187; Introduction of, into Britain, 173; Pupation of ... ..	146, 163, 187
<i>Calymnia pyralina</i> , Time of appearance of ... ..	151, 161
Capture of <i>Halesis guttatipennis</i> ... ..	259
Captures of Lepidoptera at Hythe ... ..	86
Case-making by a Depressariid larva ... ..	118
Cases of <i>Fumea betulina</i> found in the New Forest ... ..	189
<i>Catocala fraxini</i> at Farnborough (Kent) ... ..	43
<i>Catocala sponsa</i> at Hastings ... ..	86
<i>Cephenomyia rufibarbis</i> , Life-history of ... ..	11
<i>Cerura bicuspid</i> in Herefordshire ... ..	73
Chin-glands in Lepidopterous larvæ ... ..	208
<i>Choerocampa celerio</i> in a book-case, 62; at Clapton ... ..	87
<i>Chrysophanus phloeas</i> , Strange aberration of ... ..	112
<i>Cidaria sagittata</i> , Reappearance of ... ..	176
<i>Cidaria silaceata</i> and <i>Epiphyra annulata</i> , On the double-broodedness of ... ..	109
<i>Cirrhoedia verampelina</i> at Church Stretton, 186; at Southend ... ..	87
Classification of British moths, The new ... ..	287
Classification of the British butterflies ... ..	300
Cluster of cocoons of <i>Aphomia sociella</i> , On a ... ..	237
Coccid, A new British ... ..	276
Cocoons of <i>Saturnia pavonia</i> ( <i>carpini</i> ), On the colour-variation in the ... ..	238
<i>Coenonympha tiphon</i> , and its varieties, 100; At home ... ..	265
Coleoptera, A day at Lymington Salterns after ... ..	253
Coleoptera at Cromer and Horning ... ..	306
Coleoptera at Ipswich in 1895 ... ..	153, 182
<i>Colias edusa</i> at Chichester, 86; in October, 166; How, winters ... ..	250
<i>Colias edusa</i> , larva and eggs: Will Mr. Frohawk explain? ... ..	83
Collecting Ichneumonidæ ... ..	12
Colour dimorphism in <i>Xanthia fulvago</i> ( <i>cerago</i> ) ... ..	281
Colours of Dragonflies, Preservation of ... ..	145
Contents of a pheasant's crop, The insect ... ..	283
Continental localities for <i>Acidalia dilutaria</i> ... ..	126
Copulation of <i>Thyridopteryx ephemeraeformis</i> ... ..	122
<i>Cosmia paleacea</i> on Risley Moss ... ..	189
<i>Crymodes exilis</i> var. <i>assimilis</i> in Aberdeenshire ... ..	233
Crane-flies from aquatic pupæ: A query ... ..	17
<i>Culex dorsalis</i> at Aldeburgh ... ..	84
Curious earwig from Ceylon, A ... ..	262
Dark form of <i>Hyssipetes sordidata</i> ( <i>elutata</i> ) on sallow ... ..	231
Dark varieties of <i>Spilosoma menthastri</i> ... ..	143
<i>Dasycompa rubiginea</i> at Clevedon ... ..	156, 157
Data wanted ... ..	277
Dates of first appearances ... ..	316
Dates of appearance of certain insects in Devonshire, Comparison of ... ..	184
Day in the Mendel Pass, A ... ..	49
Decadence of <i>Thymelicus lineola</i> at Leigh, Essex ... ..	87
Description of the caterpillar of <i>Acidalia dilutaria</i> ( <i>holosericata</i> ) ... ..	258
Destruction of insects, The ... ..	298
Development of colour in scales of Lepidoptera ... ..	284
Development of melanism in <i>Camptogramma bitineata</i> , On the ... ..	313
Development of sex in Social Insects, On the ... ..	31
<i>Diadema misippus</i> at Teneriffe, 191; Migration of ... ..	192
<i>Diapheromera femorata</i> bred at Oxford ... ..	165
Differentiation of <i>Epuraea nana</i> and <i>E. melina</i> , 201; of <i>Eupithecia succenturiata</i> and <i>E. subfulvata</i> , 197; of <i>Scoparia basistrigalis</i> and <i>S. ambigualis</i> ... ..	189
Difficulty met with in breeding <i>Sesia sphegiformis</i> ... ..	208
Distribution of <i>Acidalia humiliata</i> in Britain, 234; of the sexual forms of <i>Noctua dahlia</i> ... ..	232
Do East Devon insects emerge late? ... ..	184

	PAGE
Dorsal spines on the larva of <i>Euvanessa antiopa</i> ... ..	150
Double-broodedness of <i>Cidaria silaceata</i> and <i>Ephyra annulata</i> , On the ...	109
Double-broodedness of <i>Pericallia syringaria</i> ... ..	149
<i>Dyscritina longisetosa</i> , Drawings of ... ..	282, 323
Early appearances of <i>Phigalia pedaria</i> ... ..	234
Early Spring notes ... ..	318
Early stages of the Satyrinae, Information wanted ... ..	114, 208
Eggs and egg-laying of <i>Epinephele ianira</i> , 208, 258; of <i>Hipparchia semele</i> ...	208
Eggs laid away from the food-plant... ..	152
Eggs of <i>Bombix rubi ichneumonoides</i> ... ..	42
Eggs of Locustidae, 323; of <i>Zeuzera pyrina</i> ... ..	305
<i>Elachista argentella</i> in the City ... ..	112
<i>Elachista cingilella</i> in the York Museum collection ... ..	259
Emergence of <i>Arctia caia</i> , in September .. ..	168
Emergence of <i>Plusia gamma</i> in December ... ..	234
<i>Emydia cribrum</i> var. <i>candida</i> reared from the egg ..	165
Entomological notes of 1895, Stray ... ..	151
Entomological reminiscences of the Tyrol ... ..	49, 221
Entomological haunts for a season ... ..	292
Entomology, Evolution, and Romance: a plea for a new departure ...	308
<i>Ephestia kühniella</i> , Food of ... ..	63
<i>Epinephele ianira</i> ab. <i>illustris</i> , nov. ab. ... ..	41
<i>Epischia banksiella</i> , Life-history of ... ..	116
<i>Epuraea nana</i> added to the British list ... ..	201
Errata ... ..	216, 240
Erratic emergence of <i>Papilio machaon</i> ... ..	184, 255
<i>Eudryas stae-johannis</i> ... ..	198
<i>Eupithecia pygmaea</i> changing its quarters annually ... ..	162
<i>Eupithecia succenturiata</i> and <i>E. subfulvata</i> ... ..	43, 88, 109, 197, 254
European Rhopalocera, The origin of ... ..	60
Evolution of nervures, On the ... ..	262
Evolutionary theories of classification ... ..	176
Exchange Baskets, Notes from the books of the ... ..	13
Exchange Club, The ... ..	61
Exhibition by the South London Entomological Society... ..	129
Extended pupal stage of <i>Nyssia zonaria</i> ... ..	315
External Parasites on Larvæ ... ..	255
Feeding habit of <i>Sesia myopiformis</i> ... ..	46
Flower-haunting Diptera ... ..	232
Flowers attractive to Moths ... ..	152
Food-plant of <i>Hyphenodes albigigalis</i> , 113, 206; of <i>Poecilocampa populi</i> , 318; of <i>Sciaphila</i> var. <i>colquhouniana</i> , 259; of <i>Sphinx pinastri</i> , 167; of <i>Vindmia</i> <i>menyanthidis</i> ... ..	166
Forcing <i>Acherontia atropos</i> ... ..	207
Genera as variable groupings ... ..	147
Genera in the Sub-family Lycæninae applied to British species, The ...	219
Genera in the Apatelidae (=Acronyctidae) ... ..	296
Generic names in <i>Apatela</i> , 57, 145; in <i>Argynnis</i> , 284; in Lycæninae ...	219
Generic term <i>Noctua</i> , On the ... ..	276
Genetic sequence in the development of scales of Lepidoptera ... ..	312
Gynandromorphous aberration of <i>Bupalus piniaria</i> , 217; of <i>Saturnia pavonia</i> ( <i>carpini</i> )... ..	208
Habits of <i>Callimorpha hera</i> (on Continent) 98; (in Guernsey and Sark), 173; of the larva of <i>Coccyx cosmophorana</i> , 192, 235; of lepidopterous larvæ, 235; of newly-emerged <i>Orrhodia ligula</i> , 209; of <i>Eupithecia subciliata</i> , 257; of Indian ant ( <i>Oecophylla smaragdina</i> ), 282; of larvæ of <i>Boarmia</i> <i>roboraria</i> in spring in nature, 280, 315; of larvæ of little-known species 280	
<i>Hadena protea</i> , A pale variety of ... ..	61
Hairs on the Micropterygides and Hepialides, Special ... ..	149
Hairworm infesting larva of <i>Chariclea umbra</i> ... ..	208
Hawk moths, The rare ... ..	166
<i>Hepialus humuli</i> , Pairing of ... ..	42
Heredity notes on <i>Eugonia quercinaria</i> ... ..	119
Hibernation, Some aspects of ... ..	169
How <i>Colias edusa</i> winters ... ..	250
How should larvæ of <i>Agrotis candelarum</i> ( <i>ashworthii</i> ) be hibernated? ...	85



	PAGE
How to breed <i>Bombyx rubi</i> ... ..	63
How to obtain larvæ of <i>Apamea ophiogramma</i> ... ..	63
How to succeed in rearing <i>Acherontia atropos</i> ... ..	86
Hybernating larvæ ... ..	316
Hybernating stage of <i>Dianthoecia capsophila</i> , 179, 180; of <i>Pyrameis cardui</i> ...	110
Hybernating the larvæ of <i>Phorodesma smaragdaria</i> , On ... ..	84
Hybernation of the female moth ... ..	149
Hybernation, On the management of larvæ during ... ..	45, 113
Hybernation, Resting habits of insects as exhibited by ... ..	1, 52, 169, 243
<i>Hyphenodes albistrigalis</i> , Food-plant of, 113, 151; Habits of ... ..	151
<i>Hypsipetes sordidata</i> ab. <i>infuscata</i> ... ..	143
Hybrids of <i>Ennomos</i> ( <i>Eugonia</i> ) <i>autumnaria</i> and <i>E. quercinaria</i> ( <i>angularia</i> ) ...	176, 189
Ichneumonidæ, A few points in collecting ... ..	12
Ideal systems of classification ... ..	211
Identity of <i>Orygia</i> ( <i>Notolophus</i> ) <i>nova</i> and <i>badia</i> with <i>Orygia antiqua</i> ...	277
Impudence of Wasps ... ..	148
Information wanted on the early stages of the Satyrinæ ... ..	114
Injury done to alders by <i>Sesia sphegiformis</i> ... ..	322
Instrument, An, to be used as an aid for setting the smaller species of Lepidoptera (illustrated), 107; for taking Lepidoptera from gas lamps ...	320
Introduction of <i>Callimorpha hera</i> into Britain ... ..	173
In what stage does <i>Thymelicus thaumas</i> hibernate? ... ..	64
July holiday, A ... ..	221
Knot-grass to the fore... ..	46
Label list of the recent additions to the British Lepidoptera ... ..	312
Labelling insects ... ..	203
Larva of <i>Plastenis subtilis</i> , 183; of <i>Cerura bicuspis</i> , 73, 186; of <i>Saturnia</i> , 42; of <i>Sphinx convolvuli</i> , 226; of <i>Luperina cespitis</i> , Description of ... ..	185
Larvæ damaging pictures, 164; of <i>Apamea ophiogramma</i> , How to obtain, 63; of <i>Dianthoecia capsophila</i> , Hybernating stage of, 180; of <i>Luperina</i> <i>cespitis</i> , 185; of <i>Teras contaminana</i> feeding on fruit of apricot, 189; On rearing young, 45; On the management of, during hybernation ... ..	45, 113
Larvæ of <i>A. atropos</i> (type and variety) at Chichester ... ..	40
Larval Genera and Subgenera in <i>Apatela</i> ... ..	295
Late emergence, An unusually, of <i>Phorodesma smaragdaria</i> ... ..	82
Lepidoptera at Bath, 206; from Orkney Islands ... ..	165
Lepidoptera of Tenerife, A few remarks on the ... ..	9
Lethargy in caterpillars ... ..	117
<i>Leucania albipuncta</i> near Ashford ... ..	84
<i>Leucophasia sinapis</i> , The varieties of, which occur in Britain ... ..	81, 207
<i>Leucania vitellina</i> at Christchurch, Hants ... ..	184
Life-history of, Notes on the, <i>Acidalia diluctaria</i> ( <i>holosericata</i> ), 193, 258; <i>Amphi-</i> <i>dasya betularia</i> , 181; <i>Coccyx cosmophorana</i> , 235, 280, 285; <i>Dianthoecia</i> <i>capsophila</i> , 179, 180, 181; <i>Emydia cribrum</i> var. <i>candida</i> , 165; <i>Epischia</i> <i>bankesiella</i> , 116; <i>Eupithecia succenturiata</i> and <i>E. sulphurata</i> , 109, 197; <i>Euvassena antiopa</i> , 150; <i>Hyphenodes albistrigalis</i> , 206; <i>Mesogona</i> <i>acetosellæ</i> , 129; <i>Nyssia lapponaria</i> , 41; <i>Oporabia jiligrammaria</i> , 289; <i>Plusia bractea</i> , 204; <i>Polia xanthomista</i> , 206; <i>Retinia resinella</i> , 285; <i>Sphinx pinastri</i> , 132; <i>Thecla roboris</i> , 186; <i>Thyridopteryx ephemerae-</i> <i>formis</i> (with Plate) ... ..	121
Light, <i>Asteroscopus sphinx</i> at ... ..	157
<i>Lithomia solidaginis</i> at Cannock Chase ... ..	112
Local Lepidoptera at Farnboro' (Kent) ... ..	183
<i>Lycaena ægon</i> var. <i>corsica</i> on the Westmoreland Mosses... ..	127
Lying Fallow ... ..	25
Macro-Lepidoptera of Dulwich and neighbourhood, Stray notes on ... ..	301
Male tufts in <i>Leucania lithargyria</i> and <i>Xanthia aurago</i> ... ..	179
Malformations in <i>Agrotis cursoria</i> , <i>A. tritici</i> , <i>Hadena trifolii</i> , <i>Naenia typica</i> ...	191
Management of larvæ during hybernation, On the ... ..	45, 113
Material basis of heredity, The ... ..	263
Melanism in <i>Camptogramma bilineata</i> , The development of ... ..	313
<i>Melitæa aurinia</i> , Variation of ... ..	140, 209
Mendel Pass, A day in the ... ..	49
<i>Merodon equestris</i> mimicking wild bees ... ..	118
<i>Mesogona acetosellæ</i> : A Noctuid new to the British list ... ..	123, 175
Method of obtaining pupæ ... ..	203

Methylated spirit and raspberry jam as a substitute for treacle ...	120
Micro collecting in 1895, 156; at Clevedon, 205; in Scotland ...	204
Micropterygides: Are they Lepidoptera or Trichoptera? ...	322
Migration of <i>Diadema nistippus</i> ...	192
Migration of Hawk Moths ...	167
Mimicking Papilios ...	210
Monstrosity in a dragon fly ...	322
Named varieties of the Larentiidae, Some ...	248
Nervures, Structure of ...	12
Neuration of Lyceninae and Pierinae ...	213
New British Bot-fly ...	321
<i>Noctua festiva</i> and <i>N. conflua</i> ...	135
Noctuid new to the British List, A ...	123
Noctuides, Varieties of, at Warrington ...	78
Nomenclature a part of the Science of Biology, Is? ...	199
Nomenclature of Bee-hawk Moths ...	276
Nomenclature of the Lyceninae ...	320
<i>Nonagria arundinis</i> var. <i>fraterna</i> ...	143
<i>Nonagria cannae</i> , Abundance of ...	157
Notes bearing on heredity ...	319
Notes from the books of the Exchange Baskets ...	13
Notes on <i>Amphidasys betularia</i> , 27, 181; on <i>Argyresthia illuminatella</i> , 200; on <i>Blaps mucronata</i> , 260; on <i>Dyscritina longisetosa</i> , 323; on breeding of <i>Psilura monacha</i> , 261; on <i>Melanippe sociata</i> , 319; on rearing <i>Polia</i> <i>xanthomista</i> , 206; on <i>Sirex gigas</i> and <i>S. juvenicus</i> ...	263
Notices of Books (see Reviews).	
Number of British species of <i>Oporabia</i> , On the ...	314
<i>Nyssia lapponaria</i> , Life-history of ...	41
OBITUARY:—Huxley, Rt. Hon. T. H., 24; Ragonot, Mons. E. L., 164; Riley, Prof. C. V., 72; Still, Major J. N., 72; Tugwell, W. H., ..	72
<i>Oporabia dilutata</i> , Abundance of ...	157
<i>Oporabia filigrammaria</i> : its aberrations and life-history (with plate) ...	289
Origin of pale patches in certain Argynnis ...	283
<i>Orneodes (Alucita) hexadactyla</i> , chiefly in relation to the structure of the pupa ...	268
Oviposition of <i>Amphidasys betularia</i> , 181; of <i>Apamea ophiogramma</i> ...	119
Painting cabinet drawers ...	277
Pairing of <i>Hepialus humuli</i> ...	42
<i>Panchlora maderae</i> in Covent Garden ...	166
Papers, The principal, on Lepidoptera published in 1895 ...	177
Parasitic insects, On the rapidity with which some perform their metamor- phoses, 111; living outside their hosts ...	114
<i>Periplaneta australasiae</i> taken at Kew ...	192
<i>Phorodesma smaragdaria</i> , abundance of larvae of 163; An unusually late emer- gence of, 82; On hibernating the larvae of ...	84
Phylogeny of Papilionida ...	212
<i>Pieris daphidice</i> at Deal ...	166
Pinning insects ...	187
<i>Plusia moneta</i> , Observations on ...	84
<i>Plusia ni</i> in Scotland? ...	204
<i>Poecilocampa populi</i> , Early appearance of ...	155
<i>Polia chi</i> var. <i>olivacea</i> ...	143
Polymorphism of <i>Hybernia defoliaria</i> ...	202
Previous error in the naming of certain beetles ...	259
Prices of British Lepidoptera, High... ..	189, 313
Probable specific identity of <i>Sciaphila penziana</i> and <i>S. colquhouniana</i> ...	194
Probable wandering habit of <i>Ceruras</i> before pupation ...	207
Protracted pupal period of <i>Papilio machaon</i> , <i>Zygaena filipendulae</i> and <i>Z.</i> <i>trifolii</i> ...	255
<i>Pseudodoxia limulus</i> , Type and paratypes of ...	118
<i>Pteromalus</i> , an external parasite ...	115
Pupæ, of certain <i>Eupitheciae</i> , 197; of <i>Papilio machaon</i> two years in pupa, 184; of <i>Micropteryx</i> ...	322
Pupal suspension of <i>Thais</i> , On the ...	81
Pupation of <i>Callimorpha hera</i> ...	46, 163, 187
Pupation of <i>Enodia hyperanthus</i> ...	258
<i>Pyrameis cardui</i> , The hibernating stage of ...	110

	PAGE
Range of <i>Thecla roboris</i> , The Geographical	187
Rare Lepidoptera, Exhibition of	283
Rarities, Captures, and Records of <i>Acidalia humiliata</i> , 234; <i>Alispa angustella</i> , 176; <i>Amara alpina</i> , 115, 166; <i>Argyresthia atomariella</i> , 282; <i>Carabus cancellatus</i> , 115; <i>Catocala fraxini</i> , 43, 115, 116, 175; <i>Chionaspis aspidistrae</i> , 276; <i>Cidaria sagittata</i> , 176; <i>Crambus myellus</i> , 180; <i>Crymodes exilis</i> , 130, 175; <i>Cucullia gnaphalii</i> , 130, 175, 233, 278; <i>Cuspidia albi</i> , 175; <i>Cynomyia alpina</i> , 189; <i>Dasyampa rubiginea</i> , 156, 157; <i>Elachista cingilella</i> , 259; <i>Elmidomorphus aubei</i> , 40; <i>Fumea betulina</i> , 176; <i>Gelechia (Lita) knaggsiella</i> , 41; <i>Halesia guttatipennis</i> , 259; <i>Icerya aegyptiaca</i> , 276; <i>Lecanopsis brevicornis</i> , 276; <i>Leucania albipuncta</i> , 120, 175; <i>Melanostoma barbifrons</i> , 12; <i>Mesogona acetosellae</i> , 123, 175, 192; <i>Noctua ditrapezium</i> , 69; <i>Notodonta carnemita</i> , 23; <i>Nyssia lapponaria</i> , 176; <i>Pachetra leucophaea</i> , 69, 175; <i>Phorbia muscaria</i> , 12; <i>Psammobius porricollis</i> , 115; <i>Sesia scoliiformis</i> , 130, 176; <i>Sphinx pinastri</i> , 181, 175; <i>Sterrra sacraia</i> , 157; <i>Tinea vineulella</i> , 176; <i>Xanthia ocellaris</i> , 130, 157, 175; <i>Xylina lambda</i>	126, 175
Rearing <i>Polia xanthomista</i> , On, 206; Young larvæ	45
Reflections and Queries on the value of Rare British Lepidoptera	316
Relationship of <i>Endronis versicolor</i> to the Sphingidos	227, 246
Remarkable Cicad larva from Ceylon	322
Reminiscences, Entomological, of the Tyrol	49, 221
Removal of fully-developed imagines from the pupa	320
Re-occurrence of <i>Xylina lambda</i> in Britain	126
Resemblances between <i>Endronis</i> and the Sphingides	248
Resting Habit of Insects, The, as Exhibited in the phenomena of hibernation and æstivation	I, 52, 169, 243
Retrospect of a Lepidopterist for 1895	174
REVIEWS AND NOTICES OF BOOKS, ETC. :—	
British and European Butterflies and Moths, A. W. Kappel, F.L.S., and W. Egmont Kirby, M.D.	190
British Moths, J. W. Tutt, F.E.S.	286
By Tangled Paths, H. Mead Briggs	285
Dorset Lepidoptera in 1892-3, N. M. Richardson, B.A., F.E.S.	116
Fauna de France—Coléoptères, by A. Aclouge	323
Frail Children of the Air, S. H. Scudder, F.E.S.	116
Handbook of British Lepidoptera, E. Meyrick, B.A., F.E.S.	179, 211
Harrow Butterflies and Moths, J. L. Bonhote, M.B.O.U., and Hon. N. C. Rothschild, F.E.S., F.Z.S.	48
List of North American Eupterotidæ, Ptilodontidæ, &c., A. R. Grote, M.A.	163
Monograph of the British Pterophorina, J. W. Tutt, F.E.S.	96
On a New Classification of the Lepidoptera, A. S. Packard, M.D.	95
Proceedings of the 7th Annual Meeting of the Association of Economic Entomologists	256
Rambles in Alpine Valleys, J. W. Tutt, F.E.S.	17
Random Recollections of Woodland, Fen, and Hill (2nd Edition), J. W. Tutt	96
Systema Lepidopterorum Hildesie, (Prof.) A. R. Grote, M.A.	71
The Cambridge Natural History (Vol. VI.), David Sharp, M.A., M.D., F.R.S., and others	190
The Honey-bee, Frank Benton, M.S.	286
Transactions of City of London Entomological Society	240
Transactions of the Leicester Literary and Philosophical Society	256
Sale of British Insects	144, 189, 236
Saline lichens probably not the food-plant of <i>Lithosia lutarella</i> .	216
Sallowers' Dream, The	279
Sallowing	241, 242
<i>Saturnia</i> , Larva of	42
Satyrinæ, The Early Stages of the: Information wanted	114
Saw-fly, Larva of a, in Somerset	68
<i>Sciaphila penziana</i> and <i>S. colquhounana</i> , Probable specific identity of	194
<i>Scoparia atomalis</i> from Eskdale	83
<i>Scoparia crataegella</i> and <i>S. mercurella</i>	183
Second brood of <i>Nemeobius lucina</i> , Partial	189
Secondary sexual characters in <i>Xanthia aurago</i> and <i>Leucania lithargyria</i>	179
Setting insects	187
Setting Lepidoptera, An instrument to be used as an aid to	107

# CONTENTS.

	ix.
PAGE	
Sex in Social Insects, On the development of ... ..	31
Sexual trimorphism in <i>Papilio cenea</i> ... ..	210
Sizes of boards for various insects ... ..	187
Slaked lime recommended for the removal of grease ... ..	115
Smell emitted by <i>Bapta bimaculata</i> ... ..	115
So-called secondary wing of <i>Dytiscus</i> ... ..	281
SOCIETIES.—	
Birmingham Entomological Society ... ..	47, 68
City of London Entomological Society ... ..	23, 69, 119, 208, 237, 259, 285
Entomological Society of London ... ..	118, 164, 191, 211, 262, 281
Nonpareil Entomological Society ... ..	68, 168
North London Entomological Society ... ..	21, 47, 68, 95, 166, 168, 239
Penarth Entomological and Natural History Society ... ..	263
South London Entomological Society ... ..	46, 67, 95, 119, 166, 192, 210, 282
Societies, The work of the Entomological, in 1895 ... ..	178
Some aspects of hibernation ... ..	169
Some named varieties of the Larentiidae ... ..	248
Sounds emitted by <i>Acherontia atropos</i> , 120; by Lepidoptera ... ..	149
South London Entomological Society's Exhibition, The ... ..	129
<i>Sphecodes rubicundus</i> , a bee new to Britain, 145; an inquiline of <i>Andrena nigroaenea</i> and <i>A. labialis</i> ... ..	145
<i>Sphinx convolvuli</i> , Abundance of, 175; at Bournemouth, 63; at Clevedon, 155; at Oxtou, 162; Bred from Cornish larvæ, 283; breeding of, with some account of its larvæ, 226; Capture of larvæ of, 116; in Caithness, 204; in Cornwall, 166; in Scotland, 204; in Staffordshire ... ..	112
<i>Sphinx pinastri</i> as a British insect, 182, 218; in Suffolk, 131; Obtaining larvæ of ... ..	175
<i>Spilosoma mendica</i> , On the interbreeding of, and its var. <i>rustica</i> ... ..	75
<i>Spilosoma menthastri</i> , A dark male of, 12; Breeding the dark variety of ... ..	40
Spring notes ... ..	316
Stepping-stone from the Old Entomology to the New ... ..	287
<i>Sterrhæa sacaria</i> in the Isle of Purbeck ... ..	157
<i>Stilbia anomala</i> at Cannock Chase ... ..	112
Strange aberration of <i>Chrysophanus phloeus</i> ... ..	112
Subdivision of <i>Argynnis</i> into three Genera ... ..	284
Submergence of larvæ feeding on salt marshes ... ..	163
Sugaring in Shetland ... ..	157
Synonymy of the varieties of <i>Coenonympha tiphon</i> ... ..	107
Table giving data relating to (1) food-plants, (2) time of appearance, &c., of the Pseudo-Bombycides in their various stages ... ..	288
Table illustrating the range of variation in <i>Xanthia fulvago</i> ... ..	231
Tabulation of the Sub-genera included in <i>Apatela</i> , Hb., with their respective types ... ..	294
Taeniocampids of a Streatham garden, The ... ..	192
Tenerife, A few remarks on the Lepidoptera of, 9; <i>Diadema missippus</i> in ... ..	191
<i>Teras contaminana</i> feeding on fruit of apricot ... ..	189
<i>Theristis mucronella</i> at ivy ... ..	183
<i>Thyatira batis</i> in August ... ..	63
<i>Thymelicus lineola</i> , Decadence of, at Leigh, Essex ... ..	87
<i>Thymelicus thaumas</i> , In what stage does it hibernate? ... ..	64
<i>Thyridopteryx ephemeræformis</i> , Life-history of (with Plate) ... ..	121
Time of appearance of <i>Scotosia certata</i> ... ..	258
Time of emergence of <i>Amphidasys betularia</i> ... ..	181
Time of flight of <i>Geometra pupilionaria</i> ... ..	321
<i>Tortrix piceana</i> , Imago of, with a larval head ... ..	41
Type of <i>Agronoma</i> , The ... ..	255
Tyrol, Entomological reminiscences of the... ..	49, 221
Uniformity in the sizes of Entomological pins used ... ..	202
Uniformity of setting ... ..	188
Unusual appearances at Montrose, 156; in the Aberdeen district ... ..	156
Urtication ... ..	263
<i>Vanessa urticae</i> at the Watch-night service ... ..	285
Variation of <i>Amphidasys betularia</i> , 181; <i>Argynnis (Dryas) paphia</i> , 283; <i>Asteroscopus sphinx</i> , 233; <i>Calania lutosæ</i> , 270; certain Noctuides occurring near Montrose, 220; <i>Hepialus humuli</i> and <i>Emmelesia albulata</i> in Shetland, 111; <i>Hybernia defoliaria</i> , 202; larva of <i>Sphinx convolvuli</i> ,	

166; larvæ of <i>Abraças grossulariata</i> , 257; <i>Melitæa aurinia</i> , Notes on the, 140, 209, 230; the colour of the cocoons of <i>Saturnia carpini</i> , 238; the psi-like mark of <i>Acronycta psi</i> and <i>A. tridens</i> ... ..	256
Varieties and aberrations of:— <i>Acidalia aversata</i> , 202; <i>Acidalia straminata</i> , 260, <i>Acronycta alni</i> , 192; <i>Acronycta megacephala</i> , 120; <i>Agriopis aprilina</i> , 210; <i>Agrotis agathina</i> , 192; <i>Agrotis lucerneæ</i> , 192; <i>Agrotis saucia</i> , 192; <i>Agrotis segetum</i> , 192; <i>Agrotis simulans</i> , 192; <i>Agrotis subrosea</i> , 192; <i>Amphidasys betularia</i> , 181; <i>Arctia caia</i> , 120; <i>Argynnis (Brentiis) euphrosyne</i> , 217; <i>Argynnis (Brentiis) selene</i> , 130; <i>Argynnis (Dryas) paphia</i> , 283; <i>Asphalia ridens</i> , 217; <i>Asteroscopus sphinx</i> , 233; <i>Boarmia gemmaria</i> , 119; <i>Boarmia repandata</i> , 151, 192, 217; <i>Bupalus piniaria</i> , 217; <i>Calamia lutosæ</i> , 270; <i>Callimorpha hera</i> , 101, 163, 174; <i>Caradrina</i> , 260; <i>Chrysophanus phloeas</i> , 112; <i>Cidaria sagittata</i> , 145; <i>Cidaria silaceata</i> , 209; <i>Coenonympha pamphilus</i> , 262; <i>Coenonympha tiphon</i> , 100; <i>Coremia munitata</i> , 176; <i>Coremia spadicearia</i> , 250; <i>Crymodes emilis</i> , 130, 233; <i>Cucullia absynthii</i> , 192; <i>Dianthoeia conspersa</i> , 221; <i>Emmelesia albulata</i> , 111; <i>Emmelesia taeniatæ</i> , 166; <i>Emydia cribrum</i> , 165; <i>Ennomos (Eugonia) quercinaria</i> , 119, 319; <i>Enodia hyperanthus</i> , 260; <i>Epinephele ianira</i> , 192, 217; <i>Epunda lutulenta</i> , 165; <i>Eupithecia denotata</i> , 249; <i>Eupithecia venosata</i> , 249; <i>Eupithecia virgaureata</i> , 249; <i>Gnophos obscuraria</i> , 260; <i>Hadena adriata</i> , 165; <i>Hadena dissimilis</i> , 260; <i>Hepialus humuli</i> , 111, 165; <i>Hybernia defoliaria</i> , 143, 202, 262, 315; <i>Hybernia leucophaæaria</i> , 218, 281; <i>Hybernia marginaria</i> , 210; <i>Hydroecia micæa</i> , 192; <i>Hypermoecia angustana</i> , 257; <i>Hypsipetes sordidata (elutata)</i> , 143, 165, 201; <i>Leucophasia sinapis</i> , 81, 201; <i>Mamestra brassicæ</i> , 120, 130; <i>Mania maura</i> , 320; <i>Melanippe fluctuata</i> , 250; <i>Melanippe implicata (montanata)</i> , 249; <i>Melanippe sociata</i> , 249, 320; <i>Melitæa aurinia</i> , 140, 209, 230; <i>Miselia oxyacanthæ</i> , 221; <i>Naenia typica</i> , 120; <i>Nemeophila plantaginis</i> , 165, 185; <i>Noctua augur</i> , 192; <i>Noctua castanea</i> , 152; <i>Noctua dahliei</i> , 232; <i>Noctua glareosa</i> , 130, 175, 221; <i>Nonagria arundinis</i> , 143; <i>Odonestis potatoria</i> , 120; <i>Oporabia dilutata</i> , 218, 232, 260; <i>Oporabia filigrammaria</i> [(? autumnaria or approximaria) with plate], 289; <i>Papilio ceneæ</i> , 210; <i>Peridroma saucia</i> , 192, 285; <i>Plebeius aegon</i> , 262; <i>Poliachi</i> , 143; <i>P. flavicincta</i> , 321; <i>Polyommatus corydon</i> , 192; <i>Polyommatus icarus</i> , 262; <i>Ptilophora plumigera</i> , 192; <i>Sciaphila penzianæ</i> , 196; <i>Scoparia crataegella</i> , 183; <i>Spilosoma menthastræ</i> , 143; <i>Stauropus fagi</i> , 130; <i>Taeniocampa gothica</i> , 165, 220; <i>Tephrosia biundularia</i> , 192; <i>Thera juniperata</i> , 165; <i>Thymelicus lineola</i> , 192; <i>Tryphaena orbona (comes)</i> , 165, 166, 283; <i>Vanessa (Aglais) urticae</i> , 131; <i>Xanthia aurago</i> , 130; <i>Xanthia fulvago</i> , 231, 281; <i>Xanthia gilvago</i> , 120; <i>Xanthia ocellaris</i> , 175; <i>Xylophasia rurea</i> ... ..	221
Varieties of Noctuides at Warrington ... ..	78
Varieties, The, of <i>Leucophasia sinapis</i> which occur in Britain ... ..	81, 201
Wandering habit of <i>Ceruras</i> before pupation, Probable ... ..	207
Wax secreted by Lepidoptera ... ..	232
Wing-clothing of the Lepidoptera, The ... ..	149
Winter notes ... ..	233
<i>Xanthia ocellaris</i> at Copdock, 166; near Richmond, Surrey ... ..	157
<i>Xylina conformis</i> in Westmoreland ... ..	183
<i>Xylina lambda</i> in Suffolk ... ..	126, 165
<i>Xylina semibrunnea</i> at Clevedon ... ..	156
Young larvæ, On rearing ... ..	45

## PAPERS AND COMMUNICATIONS READ BEFORE SOCIETIES.

## CITY OF LONDON ENTOMOLOGICAL SOCIETY:—

British representatives of the genus <i>Caradrina</i> , L. B. Prout, F.E.S. ... ..	177
<i>Calamia lutosæ</i> : its variation, habits, &c., Rev. C. R. N. Burrows ... ..	270
<i>Coenonympha tiphon</i> and its varieties, F. J. Buckell, M.B., B.S. ... ..	100
Entomology, Evolution and Romance: A plea for a new Departure, F. W. Frost, 308; Ferns, P. W. Robbins ... ..	321
Lepidoptera of Dulwich, Douglas C. Bate ... ..	260
Notes on <i>Amphidasys betularia</i> , Douglas C. Bate ... ..	27
Notes on <i>Noctua festiva</i> and <i>N. confusa</i> , F. J. Hahnbury, F.L.S., F.E.S. ... ..	77
Relationship of <i>Enadromis versicolor</i> to the Sphingides, A. Bacot ... ..	227, 246

## ENTOMOLOGICAL SOCIETY OF LONDON:—

An attempt to correlate the results arrived at in recent papers on the classification of the Lepidoptera, J. W. Tutt, F.E.S. ... ..	177
---	-----

# CONTENTS.

	xi. PAGE
Notes on Flower-haunting Diptera, G. F. Scott Elliot	... 282
Notes on pupæ: <i>Orneodes</i> , <i>Epermenia</i> , <i>Chrysocorys</i> , and <i>Pterophorus</i> , T. A. Chapman, M.D., F.E.S.	... 177
Notes on the Secretion of Potassium Hydroxide by <i>Dicranura vinula</i> and similar phenomena in other Lepidoptera, Oswald Latter, M.A., F.E.S.	177
LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY:—	
On the development of Sex in Social Insects, J. W. Tutt, F.E.S.	... 31
NORTH LONDON ENTOMOLOGICAL SOCIETY:—	
Notes on the genus <i>Bryophila</i> , Miss Prout	... 22
The Rare Hawk Moths, by L. B. Prout, F.E.S.	... 166
SOUTH LONDON ENTOMOLOGICAL SOCIETY:—	
The genus <i>Argynnis</i> with particular reference to varieties having pale areas, R. South, F.E.S.	... 283

## LIST OF PLATES AND WOODCUTS.

Woodcut.—Instrument to be used for setting small insects	... 108
Plate 1.—The Bagworm ( <i>Thyridopteryx ephemeraeformis</i> )	... 121
Plate 2.—Aberrations of British Lepidoptera	... 217
Plate 3.—Aberrations of <i>Oporabia filigrammaria</i>	... 289

## INDEX TO LOCALITIES.

	PAGE		PAGE
AOSTA ...	98	Pejo ...	222
BERKSHIRE:—Reading, 160; Basing- stoke ...	160	Scotland and North of England ...	112
Bregenz (The Pfänder) ...	99	SCOTLAND:—Aberdeen, 92, 161, 204, 233, 278; Braemar, 92, 204; Forres, 15, 92; Glasgow, 113, 159; Kincardine, 92, 204; Loch Lomond, 159; Luss, 6, 14; Montrose, 13, 92; Morayshire, 204; Perth, 92, 204; Rannock, 292; Shetland, 91; South Ar- gyllshire ...	92, 315
CAMBRIDGESHIRE:—Wicken, 44, 65, 90, 293; Chippenham ...	293	SHROPSHIRE:—Church Stretton, 185; Whitechurch ...	16, 88
Campiglio ...	222	SOMERSET:—Bath, 204; Castle Cary, 112; Clevedon, 43, 87, 159, 205; Ilminster, 42; Wellington, 63, 112; Yeovil ...	112
Cogne Valley ...	98	Sorapiss, The ...	126
CUMBERLAND:—Keswick, 17, 89 ...	233	STAFFORDSHIRE:—Cannock Chase, 112; Rugeley ...	43, 112
DEVONSHIRE:—Babbacombe, 184; Bideford, 184; Exmouth, 184; Honiton, 188, 184; Oxtou, 162, 184, 233, 316	112, 298	SUFFOLK:—Bury St Edmunds, 162; Copdock, 126, 131; Ipswich, 153, 182; Tuddenham ...	293
DORSET: Portland ...	112, 298	SURREY:—Caterham, 63; Dulwich, 801; Wimbledon ...	321
ESSEX: Forest Gate, 92; Leigh, 87, 88, 113; Rainham, 65, 114, 270; Southend 44, 87, 159, 232	159, 205; Tewkesbury 158, 232	SUSSEX:—Abbot's Wood, 293; Bo- diam, 89; Chichester, 40, 86; Hastings ...	86
GLOUCESTERSHIRE:—Coxhorne, 89, 159, 205; Tewkesbury 158, 232	158, 232	Teneriffe ...	9
HAMPSHIRE:—Bournemouth, 63; Emsworth, 232, 278; Lyming- ton, 253; Lyndhurst, 65; New Forest, 44, 65, 815; Southampton 65	240	Val d'Amprezzo ...	126
HEREFORDSHIRE:—Dinmore ...	161	WALES:—Carmarthenshire, 321; Milford Haven, 159; Tenby, 89, 161; Swansea ...	159
HERTFORDSHIRE:—Waltham Cross	64, 318	Westmoreland Mosses ...	127
Hildesheim ...	92, 203; Sandown ...	YORKSHIRE:—Beedale, 43; Don- caster, 44, 88, 160, 278; Sea- mer Moor, 88; Sledmere, 43; York ...	14, 162, 315
ISLE-OF-WIGHT:—Freshwater, 92, 203; Sandown ...	293		
KENT: Chatham, 90; Dover, 62; Farnboro', 43, 183; Folkestone, 293; Hythe, 88; Tunbridge Wells, 113; Wye ...	49		
Mendel Pass, The ...	293		
NORFOLK:—Cromer, 306; Horning, 293, 306; King's Lynn 161; Ranworth ...	16, 232, 265		
NORTHUMBERLAND:—Morpeeth, 16, 160, 232, 265			

## LIST OF CONTRIBUTORS, Etc.

Acton, T. ...	78	Bacot, A. ...	227, 246, 261, 319
Alderson, Hope ...	43, 183	Banks, Eustace R., M.A., F.E.S.	157, 181, 187, 200
Anderson, Jos., jun. 40, 86 (twice)		Bate, D. C. ...	27, 301
Atmore, E. A., F.E.S. ...	162		

	PAGE		PAGE
Bayne, A. F. ...	17	Lemann, Fred. C., F.E.S. ...	221
Beadle, H. A. ...	17, 89, 233	Luff, W. A. ...	173
Beeching, R. A. Dallas, F.E.S. ...	113	Mackonochie, (Rev.) J. A., B.A., F.E.S. ...	204
Bell, J. S. ...	278	Macmillan, E. (Mrs.) ...	278
Blandford, W. H., M.A., F.Z.S., F.E.S. ...	263	Macmillan, W. ...	63, 112
Booth, G.A., F.E.S. ...	158, 181	Maddison, T. 13, 15, 40, 43, 83, 85, 88, 112, 144, 155, 202, 203	
Bouskell, Frank, F.E.S. ...	253	Mason, J. 43, 87, 149, 155, 156, 159, 205	
Bowles, E.A., M.A., F.E.S. 143, 157, 161		Massey, Herbert, F.E.S. ...	127
Brady, L. S. ...	64, 65, 85, 234	May, H. H. ...	238
Brown, H. Rowland, M.A., F.E.S. ...	316	Maze, W. P. Blackburne, F.E.S. ...	218
Buchan, F. W. ...	156	Mera, A. W. ...	92, 202
Buckell, F. J., M.B., B.S. ...	46, 100	Miller, Elizabeth (Miss) ...	237
Bull, John ...	316	Moberly, J. C., M.A., F.E.S. ...	44, 65, 90, 233, 315
Burrows, (Rev.) C.R.N. 63, 65, 114, 188, 206, 260, 270		Morley, Claude, F.E.S. 153, 182, 279	
Bush, E. R. 92, 156, 202, 205, 233		Murray, H. ...	180, 183, 206
Butler, W. E. ...	238	Newbery, C. ...	278
Cambridge, (Rev.) O. Pickard, M.A., F.E.S. ...	218	Newbery, E. A. ...	239
Cannon, A. E. ...	161, 233	Newnham, F. B., M.A. ...	185
Chapman, T. A., M.D., F.E.S. 59, 73, 81, 225, 268, 296		Nicholson, C., F.E.S. ...	230, 320
Christy, W. M., M.A., F.E.S. 13, 40, 92, 143, 202, 208, 232, 278, 315		Nicholson, W. E., F.E.S. ...	186
Clark, J. A., F.E.S. ...	107, 289	Norgate, F. ...	162, 179, 203
Clarke, H. Shortridge, F.E.S. ...	180	Partridge, (Colonel) C.E. ...	259
Cope, W. A. ...	157	Porter, Endymion, jun. ...	12
Corbett, H. H., M.R.C.S. 44, 83, 88, 112, 156, 160, 278		Prout, Louis B., F.E.S. ...	109, 124, 199, 206, 248, 319
Crompton, S. E., F.E.S. ...	9	Quail, Ambrose ...	277, 280
Dalglish, A. Adie, 14, 159, 232, 234		Richardson, Nelson M., B.A., F.E.S. ...	112, 231, 284, 257
Dannatt, Walter, F.Z.S., F.E.S. ...	86	Riding, W. S., B.A., M.D., F.E.S. ...	61, 109, 113, 143, 151, 183, 184, 187, 201, 202, 234, 243, 257 (twice), 280
Darlaston, H. W. H. ...	17	Robertson, (Major) R. B. 89 (twice), 149, 160, 205	
Dixey, F.A., M.A., M.D., F.E.S. ...	170	Robson, J. E., F.E.S. ...	266
Druitt, A., ...	184	Salvage, William ...	280 (twice)
Dunn, G. N., M.R.C.S. ...	263	Sheldon, W. G. ...	198
Elliman, E. G. ...	306	Smith, (Prof.) J. B., D.Sc. ...	198
Esam, W. W. ...	86, 89, 90	Studd, E.F., M.A., B.C.L., F.E.S. ...	157, 162, 184, 188, 203, 233, 234, 255, 277, 316, 318
Evans, J. E., B.A. ...	278	Sturt, W. T. ...	226
Fenn, Charles, F.E.S. 46 (twice), 258 (twice)		Thellusson, (Hon.) F. ...	131
Finlay, J. 16, 42, 63, 83, 160, 203, 232		Thompson, J. P. ...	42
Fox, (Rev.) E. C. Dobrée, M.A. 158, 184, 232, 258		Thornewill, (Rev.) C. F., M.A. 16, 88	
Freer, Richard, M.B. 43 (twice), 83, 112 (twice), 255		Thornhill, W. B. ...	63
Frost, Fredk. W. ...	308	Tremayne, L. J. ...	239
Goodwin, Edward ...	278	Trow, A. H., B.Sc. ...	263
Green, E.E., F.E.S. ...	262	Turner, H. J., F.E.S. 82, 157, 163, 231	
Greer, T. ...	206	Tutt, J. W., F.E.S. 1, 31, 49, 58, 61, 63, 64, 75, 81, 83, 97, 110, 111, 113, 114, 121, 123, 126, 129, 132, 140, 143, 148, 150, 174, 180, 195, 198, 200, 208, 209, 219, 224, 232, 233, 235, 241, 250, 257, 258, 280, 292, 300, 314	
Griffiths, C. G., F.Z.S., F.E.S. ...	194	Twopenny, D. (Mrs.) ...	45
Grote, (Prof.) A.R., M.A., 42, 56, 57, 65, 96, 147, 149, 150, 240, 256, 294, 295		Vivian, H. W., B.A., F.E.S. ...	16
Gunning, Montague, M.D. 13, 92, 156, 187, 188, 220, 318		Walker, S. ...	14, 143, 162, 315
Hall, T. W., F.E.S. ...	208, 257	Waterhouse, C. O., F.E.S. ...	262
Hamm, A. H. ...	161	Webb, Sydney, 15, 62, 235, 255, 258, 315	
Hanbury, F. J., F.L.S., F.E.S., 87, 118, 135		Whittle, F. G. 44, 85, 87 (twice), 88, 112, 113, 159, 163, 232	
Hayward, A. R. ...	42	Williams, C. W. ...	45, 263, 279
Hewett, (Rev.) G.M.A., M.A. ...	25	Wolfe, John J. ...	255, 258 315
Hodge, Harold, M.A. ...	298		
Horne, Arthur ...	92, 204, 278		
Kane, W. F. de Vismes, M.A., F.E.S. 52, 209, 230, 318			
Keays, A. Lovell, F.E.S. ...	68		
King, J. J. F. X., F.E.S. 91, 111, 113, 156, 158, 163, 203			

---

---

## **SPECIAL INDEX**

**(Coleoptera and Lepidoptera by G. B. Routledge, F.E.S. ;  
other Orders by J. W. Tutt, F.E.S.)**

---

---



# The Entomologist's Record and Journal of Variation.

VOL. VII.

## SPECIAL INDEX.

Arranged in order of Species.

COLEOPTERA.			PAGE			PAGE
Actobius procerulus	...	...	154	Bagous diglyptus	...	183
signaticornis	...	...	154	petro	...	40
Aëpus marinus	...	...	254	tempestivus	...	182
robinii	...	...	254	Balaninus tessellatus	...	183
Agathidium nigrinum	...	...	183	villosus	...	183
Agilus laticornis	...	...	182	Baptolinus alternans	...	154
Aleochara lata	...	...	154	Barynotus obscurus	...	182
moerens (fungivora)	...	...	154	Batophila aerata	...	182
Amalus hæmorrhous	...	...	307	Bembidia	...	306
Amara alpina	...	115, 166		Bembidium affine	...	306
fulva	...	...	306	anglicanum	...	306
lunicollis	...	...	153	ephippium	...	254
Anacæne	...	...	153	femoratum	...	308
Anaspis subtestacea	...	...	182	lunatum	...	306
Anchomenus puellus	...	...	308	minimum	...	254
Anobium	...	...	164	normannum	...	254
Anobium fulvicorne	...	...	182	Berosus luridus	...	153
Anthicus floralis	...	...	182	Blaps	...	261
humilis	...	...	254	Blaps mucronata	...	260
salinus	...	...	254	Bledius	...	306
Aphthona lutescens	...	...	182	Bledius crassicolis	...	306
nonstriata (coerulea)	...	...	182	opacus	...	306
Apion	...	182, 183		pallipes	...	306
Apion aethiops	...	...	183	taurus	...	154
carduorum	...	...	183	BRACHELYTRA	...	154
confluens	...	...	183	BRACHELYTRON	...	154
difforme	...	...	183	Brachypterus pubescens	...	183
ervi	...	...	183	urticæ	...	155
hookeri	...	...	183	Bryaxis waterhousei	...	254
loti	...	...	183			
pisi	...	...	183	Caenopsis waltoni	...	182
pubescens	...	...	183	Cafius xantholoma	...	154, 254
radiolus	...	...	183	Callicerus obscurus	...	154
simile	...	...	183	Carabus cancellatus	...	115
tenue	...	...	183	Cercus bipustulatus	...	155
trifolii	...	...	183	Cercyon analis	...	154
varipes	...	...	183	haemorrhoidalis	...	154
viciae	...	...	183	littoralis	...	154
vorax	...	...	183	nigriceps	...	154
Apteropeda orbiculata (graminis)	...	...	182	unipunctatus	...	154
Atemeles emarginatus	...	...	154	Cerylon histeroideus	...	155
Atomaria mesomelas	...	...	155	Cetonia aurata	...	239
nigriventris (nana)	...	...	155	Ceuthorrhynchideus floralis	...	182
ruficornis	...	...	155	mixtus	...	41
				nigroterminatus	...	41
				quercicola (crotchii)	...	41

	PAGE		PAGE
<i>Ceuthorrhynchus assimilis</i> ...	182	<i>bicolora</i> ( <i>sagittariae</i> ) ...	182
<i>chalybaeus</i> ...	182	<i>braccata</i> ( <i>nigra</i> ) ...	307
<i>contractus</i> ...	182	<i>cinerea</i> ...	307
<i>cyanipennis</i> ...	182, 306	<i>clavipes</i> ( <i>menyanthidis</i> ) ...	307
<i>pictarsis</i> ...	306	<i>crassipes</i> ...	307
<i>resedae</i> ...	306	<i>dentipes</i> ...	307
<i>rugulosus</i> ...	182	<i>impressa</i> ...	307
<i>viduatus</i> ...	307	<i>limbata</i> ( <i>lemnae</i> ) ...	307
<i>Choleva morio</i> ...	155	<i>semicuprea</i> ...	307
<i>velox</i> ...	155	<i>versicolora</i> ( <i>bidens</i> ) ...	182
<i>Chrysomela</i> ...	324	<i>Dorytomus</i> ( <i>Erirrhinus</i> ) <i>validirostris</i>	183
<i>didymata</i> ...	182	<i>Dyschirius thoracicus</i> ...	306
<i>goettingensis</i> ...	67	<i>Dytiscus latissimus</i> ...	281
<i>orichalcia</i> ( <i>lamina</i> ) ...	183	<i>marginalis</i> ...	68
<i>varians</i> ...	182	<i>Elaphrus uliginosus</i> ...	254
<i>Cicindela gothica</i> ...	324	<i>Elatér elongatulus</i> ...	46
<i>Cillenus lateralis</i> ...	254	<i>Elmidomorphus aubei</i> ...	40
<i>Cionus blattariae</i> ...	182	<i>Elmis aeneus</i> ...	155
<i>pulchellus</i> ...	182	<i>Enicmus</i> ( <i>Lathridius</i> ) <i>minutus</i>	155
<i>scrophulariae</i> ...	182	<i>transversus</i> ...	155
<i>tuberculosus</i> ( <i>verbasci</i> ) ...	182	<i>Epuraea melina</i> ...	201
<i>Cis bidentatus</i> ...	308	<i>nana</i> ...	201
<i>villosulus</i> ...	183	<i>pusilla</i> ...	155
CLAVICORNIA ...	155	<i>Erirrhinus acridulus</i> ...	182
<i>Cleonus sulcirostris</i> ...	183	<i>bimaculatus</i> ( <i>maculatus</i> )	280
<i>Coelambus parallelogrammus</i> ...	153	<i>festucae</i> ...	183
<i>Coeliodes fuliginosus</i> ...	182	<i>validirostris</i> ...	183
<i>ruber</i> ...	182	<i>Eumicrus tarsatus</i> ...	183
<i>Conopalpus testaceus</i> ...	182	<i>Falagria sulcata</i> ...	154
<i>Coninomus</i> ( <i>Lathridius</i> ) <i>nodifer</i>	155	<i>Galeruca tenella</i> ...	182
<i>Conosoma pubescens</i> ...	154	<i>lineola</i> ...	308
<i>Copris</i> ...	182	<i>Geotrupes</i> ...	280
<i>lunaris</i> ...	182	<i>stercorarius</i> ...	182
<i>Corticaria elongata</i> ...	155	<i>Gnathocerus cornutus</i> ...	182
<i>gibbosa, vide Melanophthalma gib-</i>		<i>Goliathus rufus</i> ...	263
<i>bosa</i> ...		<i>Gronops lunatus</i> ...	254
<i>Crioceris asparagi</i> ...	182	<i>Gymnetron antirrhini</i> ( <i>noctis</i> )	182
<i>lilii</i> ( <i>merdigera</i> ) ...	119	<i>Gymnusa brevicollis</i> ...	154
<i>Cryptarcha strigata</i> ...	155	<i>Gyrophaena</i> ...	154
<i>Cryptocephalus aureolus</i> ...	46	<i>fasciata</i> ( <i>congrua</i> ) ...	154
<i>coryli</i> ...	46	<i>nana</i> ...	154, 308
<i>hypochaeridis</i> ...	240	<i>Haliplus cinereus</i> ...	153
<i>ochrostoma</i> ( <i>nitidulus</i> ) ...	46	<i>Haltica ericeti</i> ...	182
<i>pusillus</i> ...	90	<i>Haploderus coelatus</i> ...	90
<i>sex-punctatus</i> ...	182	<i>Harpalus</i> ...	90
<i>Cryptohypnus quadripustulatus</i>	182	<i>azureus</i> ...	90
<i>Cryptophagidae</i> ...	155	<i>puncticollis</i> ...	90
<i>Cryptophagus</i> ...	324	<i>rotundicollis</i> ...	90
<i>acutangulus</i> ...	155	<i>sabulicola</i> ...	90
<i>lycoepardi</i> ...	155	<i>Helophorus aeneipennis</i> ...	153
<i>pilosus</i> ...	155	<i>affinis</i> ...	153
<i>scanicus</i> ...	155	<i>brevipalpis</i> ...	153
<i>Curculionidae</i> ...	253	<i>Heterocerus marginatus</i> ...	306
<i>Cybister roeselii</i> ...	281	HETEROMERA ...	182
<i>Cychramus luteus</i> ...	90	<i>Hippodamia 13-punctata</i> ...	155
<i>Cychnus rostratus</i> ...	153	<i>Hippuriphila modeeri</i> ...	182
<i>Cymindis vaporariorum</i> ...	48	<i>Homalium, vide Omalium</i>	
<i>Cyrtotriplax bipustulata</i> ...	155	<i>Homalota, aterraima</i> ...	154
<i>Dacne humeralis</i> ...	308	<i>atramentaria</i> ...	154
<i>Dasytes flavipes</i> ( <i>plumbeus</i> )	182, 183	<i>cauta</i> ( <i>parva</i> ) ...	154
<i>Dermestes murinus</i> ...	254		
<i>undulatus</i> ...	254		
<i>Donacia</i> ...	307		
<i>Donacia affinis</i> ...	182		

	PAGE		PAGE
circellaris ... ..	154	Melanophthalma gibbosa ... ..	155
elongatula ... ..	154	Melasoma longicollis ... ..	182
euryptera (succicola) ... ..	154	Meligethes brunnicornis ... ..	155, 183
fungicola ... ..	154	"    difficilis ... ..	155
gagatina ... ..	154	"    memonius ... ..	155
graminicola ... ..	154	"    obscurus ... ..	307
gregaria ... ..	154	Meloë proscarabaeus ... ..	253
longicornis ... ..	154	Melolontha vulgaris ... ..	239
sordida (melanaria) ... ..	154	Metabletus obscuroguttatus ... ..	153
triangulum ... ..	154	Monotoma piceipes ... ..	155
vestita ... ..	154, 183	Mordellistena abdominalis ... ..	182
vicina ... ..	154	pumila ... ..	182
HYDRADEPHAGA ... ..	153	Mycetophagus piceus ... ..	155, 308
Hydraena testacea ... ..	153	Mycetoporus splendens ... ..	154
Hydrochus angustatus ... ..	153	Myllaena ... ..	324
HYDROPHILIDAE ... ..	153	Myrmecoxenus vaporariorum ... ..	155
Hydrophilus piceus ... ..	68		
Hydroporus erythrocephalus ... ..	153	Nebria complanata ... ..	324
halensis... ..	153	livida ... ..	306
lituratus ... ..	153	Necrobia violacea ... ..	182
neglectus ... ..	307	Necrophorus humator ... ..	239
nigrita ... ..	153	vestigator ... ..	239
pictus ... ..	153	Nitidula rufipes ... ..	155
pubescens (melanocephalus) ... ..	153		
umbrosus ... ..	307	Oethebius bicolor ... ..	254
Hygronoma dimidiata ... ..	154	lejolisi... ..	41
Hylastes palliatus ... ..	183	pygmaeus ... ..	153
Hylesinus crenatus ... ..	183	Ocypus brunnipes ... ..	154
Hypocyrtus longicornis ... ..	154	olens ... ..	239
Hypophloeus bicolor ... ..	182	similis ... ..	154
		Odacantha melanura ... ..	307
Laccobius ... ..	324	Odontaeus ... ..	182
alutaceus ... ..	153	Oedemera nobilis ... ..	253
minutus ... ..	324	Olibrus bicolor (liquidus) ... ..	155
LAMELLICORNIA ... ..	182	millefolii ... ..	307
Lathridiidae ... ..	155	Olophrum piceum ... ..	154
Lathridius lardarius ... ..	155	Omalius caesum ... ..	154
minutus ... ..	155	excavatum (fossulatum) ... ..	154
nodifer ... ..	155	pusillum ... ..	154
transversa ... ..	155	riparium ... ..	254
Leiopus nebulosus ... ..	182	rufipes ... ..	254
Leistotrophus murinus ... ..	154	Omosiphora (Epuraea) limbata ... ..	308
Leptacinus linearis ... ..	154	Onthophilus striatus ... ..	155
parumpunctatus ... ..	154	Orchestes avellanae ... ..	182
Leptusa ruficollis, vide Sipalia ruficollis	154	rusci ... ..	182
Licinus depressus ... ..	90	stigma ... ..	182
silphoides ... ..	90	Otiorrhynchus rugifrons ... ..	254
Limnebius papposus ... ..	153	Oxyomus porcatius ... ..	182
truncatellus ... ..	153	Oxypoda ... ..	324
Liosoma ovatum ... ..	182	opaca ... ..	154
Lixus paraplecticus ... ..	307	Oxyporus rufus ... ..	154
LONGICORNIA ... ..	279	Oxytelus laqueatus ... ..	183, 254
Longitarsus (Thyamis) anchusae ... ..	182	nitidulus ... ..	154
atricollis ... ..	182	sculpturatus ... ..	254
holsatica ... ..	307	sculptus ... ..	154
laevis ... ..	182	tetracarinus ... ..	154
membranaceus (tenerii) ... ..	182		
nasturtii ... ..	182	Paederus littoralis ... ..	154
Loxoprosopus ceramoides ... ..	308	riparius ... ..	308
Lucanus cervus... ..	239	Palorus (Hypophloeus) melinus (de-	
Lycoperdina bovistae ... ..	183	pressus) ... ..	259
		ratzeburgi ... ..	259
Malachius aeneus ... ..	182	subdepressus ... ..	259
Malthinus fasciatus ... ..	183	Patrobis excavatus ... ..	153
Malthodes dispar ... ..	182	Phalacrus carici ... ..	155

	PAGE		PAGE
Philonthus ... ..	154	bifoveolatus ... ..	154
albipes ... ..	183	bupthalmus ... ..	154
discoideus ... ..	154	circularis ... ..	154
intermedius ... ..	154	erichsoni ... ..	154
laminatus ... ..	154	impressus ... ..	154
Philonthus lucens ... ..	154	latifrons ... ..	154
sanguinolentus ... ..	183	nitidiusculus ... ..	154
sordidus ... ..	154	pallipes ... ..	154
rossulus ... ..	154	pallitarsis ... ..	154
umbratilis ... ..	154	picipes (rusticus) ... ..	154
Philydrus nigricans ... ..	153	pusillus ... ..	154
ovalis ... ..	153	STERNOXI ... ..	182
suturalis ... ..	153	Strangalia quadrifasciata ... ..	307
testaceus ... ..	153	Sunius angustatus ... ..	154
Phloeobium clypeatum ... ..	183		
Phloeophthorus rhododactylus ... ..	183	Tachypus pallipes ... ..	306
PHYTOPHAGA ... ..	182	Tachys ... ..	254
Pogonus chalcus ... ..	254	scutellaris ... ..	254
littoralis ... ..	254	Tachyusa umbratica ... ..	307
Polydrusus chrysomela ... ..	254	Telephoridae ... ..	233
Prasocurus junci (beccabungae) ... ..	182	Telephorus flavilabris ... ..	182
Prionus coriarius ... ..	182	fuscus ... ..	253
Pristonychus terricola (subcaneus) ... ..	153	lituratus ... ..	182
Procas armillatus ... ..	323	thoracicus ... ..	307
Psammobius poricollis... ..	115	Telmatoophilus caricis ... ..	155
Psyllodes affinis... ..	183	Thamiasia cinnamomea ... ..	154
chalconera ... ..	182	Thiasophila angulata ... ..	154
picina ... ..	307	Throscus dermestoides ... ..	182
Ptilinus pectinicornis ... ..	183	Thryogenes (Eriirrhinus) festucae ... ..	183
Pterostichus lepidus ... ..	48	Thyamis ... ..	90
Pyrophorus ... ..	164	Thymalus limbatus ... ..	48
		Timarcha coriaria ... ..	240
Quedius fulgidus ... ..	254	Trogophloeas bilineatus ... ..	154
		rivularis ... ..	183
Rhagium inquisitor ... ..	182, 285	Trox sabulosus ... ..	182, 216
Rhampus flavicornis ... ..	182	Tychius tomentosus ... ..	182
Rhinoncus gramineus (inconspectus) ... ..	182, 307	Tychus niger ... ..	155
perpendicularis ... ..	182		
Rhizostrogos solstitialis ... ..	239	Xenusa sulcata ... ..	154
REYNCOPEORA ... ..	182	Xestobium, tessellatum ... ..	182
Saperda carcharias ... ..	182	<b>DIPTERA.</b>	
populnea ... ..	182	Anthomyia ... ..	69
Saprinus rugifrons ... ..	183		
Scaphidium quadrimaculatum... ..	155	Bibio marci ... ..	283
Scaphisoma agaracinum ... ..	155		
Scirtes orbicularis ... ..	308	Calliphora erythrocephala ... ..	240
hemisphaericus ... ..	308	Cephenomyia rufibarbis ... ..	321, 11
Scymnus frontalis ... ..	155	Culex dorsalis ... ..	84
pygmaeus ... ..	183	Cymindis vaporariorum ... ..	48
Sermyla halensis ... ..	90	Cynomyia alpina ... ..	189
Silis ruficollis ... ..	307		
Simplocaria semistriata ... ..	155	Dolichopus ... ..	69
Sinodendron cylindricum ... ..	47		
Sipalia (Leptusa) ruficollis ... ..	154	Helophilus frutetorum ... ..	69
Sitones orinitus... ..	90, 182	transfugus ... ..	69
humeralis ... ..	183		
sulcifrons ... ..	182	Leptomorphus walkeri ... ..	118
tibialis ... ..	182		
Staphylinus stercorarius ... ..	90	Melanostoma barbifrons ... ..	12
SPHAERIDIDAE ... ..	154	hyalinatum ... ..	118
Sphaeridium marginatum ... ..	154	quadrimaculatum ... ..	260
Stenus ... ..	154	scalare ... ..	47
ater ... ..	154	Merodon equestris ... ..	118

	PAGE
<i>Musca domestica</i> ...	240
<i>vomitioria</i> ...	38, 38
<i>Oxycera trilineata</i> ...	260
<i>Phora rufipes</i> ...	322
<i>Phorbia muscaria</i> ...	12
<i>Pollenia rudis</i> ...	240
<i>Scatophaga</i> ...	69
<i>Spilomyia speciosa</i> ...	118
<i>Syrphus annulipes</i> ...	69

## HEMIPTERA.

## HOMOPTERA.

<i>Chionaspis aspidistae</i> ...	276
<i>Cicadinae</i> ...	322
<i>Icerya aegyptiaca</i> ...	276
<i>Lecanopsis brevicornis</i> ...	276
<i>Ripersia fraxini</i> ...	276
<i>Zierona caerulea</i> ...	166

## HYMENOPTERA.

<i>Andrena labialis</i> ..	145
<i>nigraenea</i> ...	145
<i>rosae var. trimmerana</i> ...	47
<i>Anthidium manicatum</i> ...	69
<i>Apidae</i> ...	118
<i>Crabro dimidiatus</i> ...	69
<i>palmipes</i> ...	48
<i>Criorhina aselica</i> ...	47
<i>Eumenes coarctata</i> ...	192
<i>Ichneumon fuscipes</i> ...	284
<i>Ichneumonidae</i> ...	12
<i>Myrmosa melanocephala</i> ...	69
<i>Nematus pavidus</i> ...	68
<i>Nomada flavoguttata</i> ...	69
<i>ochrostoma</i> ...	69
<i>ruficornis</i> ...	69
<i>Oecophylla smaragdina</i> ...	282
<i>Pteromalus</i> ...	114
<i>Sirex gigas</i> ...	46, 263
<i>juvencus</i> ...	263
<i>Sphecodes rubicundus</i> ...	145
<i>Trichogramma eyanescens</i> ...	67

	PAGE
<i>Vespa germanica</i> ...	284
<i>Xylophaga</i> ...	263

## LEPIDOPTERA.

<i>abbreviata, Eupithecia</i> ...	159, 242, 316
<i>abietaria, Boarmia</i> ...	65
<i>abietella, Dioryctria (Phycis)</i> ...	162, 176, 205, 280
<i>abscondita, Arctomyseis</i> ...	294, 296
<i>absinthiata, Eupithecia</i> ...	14, 197
<i>absynthii, Cucullia</i> ...	192
<i>acanthodactyla, Amblyptilia</i> ...	89
<i>Acentropus</i> ...	96
<i>aceris, Acronycta</i> ...	57, 58, 59, 120, 146, 148, 285, 294, 295, 303
<i>acetosellae, Mesogona</i> ...	123, 175, 192
<i>Acherontia</i> ...	247
<i>achilleae, Zygaena</i> ...	20, 50
<i>achine, Pararge</i> ...	224
<i>Acidaliinae</i> ...	287
<i>acis, Nomia (Lycaena)</i> ...	189
<i>Acronicta</i> ...	57, 58, 294, 295
<i>Acronycta</i> ...	57, 58, 146, 147, 199, 224, 225, 226, 295, 297
<i>Acronyctidae</i> ...	297
<i>Acronyctidi</i> ...	58, 146, 200
<i>actaea, Satyrus</i> ...	224
<i>actaeon, Thymelicus (Pamphila)</i> ...	116, 300
<i>adaequata (blandiata), Emmelesia</i> ...	51, 52
<i>adippe, Argynnis</i> ...	50, 99, 189, 223, 284, 301
<i>var. cleodoxa</i> ...	223
<i>adusta, Hadenia</i> ...	93, 94, 165, 175
<i>advena, Aplecta</i> ...	66, 88, 90, 151, 206, 215, 245
<i>aegon, Plebeius (Lycaena)</i> ...	47, 65, 89, 118, 120, 128, 129, 214, 220, 223, 262, 300
<i>var. corsica</i> ...	127, 129
<i>aello, Oeneis</i> ...	222, 224
<i>Aelopus</i> ...	57
<i>aeratella, Asychna</i> ...	276
<i>aescularia, Anisopteryx</i> ...	206, 278, 279, 287, 316
<i>aestiva, Lycaena</i> ...	11
<i>aethiops, Erebia</i> ...	14, 51, 52, 71, 99, 224, 301
<i>affinis, Calymnia</i> ...	88, 91, 151, 158, 160, 161, 183, 215, 283, 304
<i>affinitata, Emmelesia</i> ...	14
<i>afflicta, Acronycta (Apatela)</i> ...	146, 296
<i>agathina, Agrotis</i> ...	89, 152, 162, 192
<i>ab. rosea</i> ...	152
<i>aglaia, Argynnis</i> ...	26, 47, 50, 89, 93, 99, 223, 284, 301
<i>Aglais</i> ...	301
<i>Agronoma</i> ...	255, 256
<i>Agrotidae</i> ...	163, 295, 296
<i>Agrotides</i> ...	71, 150
<i>Agrotis</i> ...	255, 256
<i>albiceps, Poecilia</i> ...	113
<i>albicollata, Melanthia</i> ...	44, 46, 159
<i>albicollis, Acontia</i> ...	317

	PAGE		PAGE
albicolon, Mamestra	16, 89, 94, 215	Apaturinae	... 301
albifusa, Hadenæ...	... 323	apiciaria, Epione	... 66
albina, Caradrina	... 260	apiformis, Trochilium	... 91, 149
albipuncta, Leucania	84, 95, 120, 175, 190, 293, 314	apollo, Parnassius	... 21, 223, 282
albistrigalis, Hyphenodes	113, 151, 166, 206	Aporia	... 240, 301
albovenosa (venosa), Viminia	58, 66, 67, 90, 91, 95, 147, 148, 175, 293, 296, 297	Aporidi...	... 301
albulata, Emmelesia	... 91, 111	Aporinae	... 11
var. thule	... 91	Aporophyla	... 215
alchemillata, Emmelesia	... 14	approximaria, Oporabia	... 291, 292
alciphron, Polyommatus	...	aprilina, Agriopis	66, 88, 94, 156, 159, 205, 206, 210, 214
var. gordius	... 223	arcana, Coenonympha	... 224
alcippoides, Danaïs	... 11	var. darwiniana	... 224
alcippus, Limnas	... 321	archippus, Anosia	... 11, 189, 301
alcon, Lycaena	... 222, 223	Arctia	... 7, 214, 225
algae, Bryophila	... 22	Arctiidae	... 214
allantiformis, Sesia	... 313	Arctiidae	... 58, 214, 226
alni, Acronycta	57, 58, 59, 73, 88, 89, 145, 146, 148, 175, 192, 294, 296	Arctomyscis	57, 58, 59, 148, 240, 294, 296
alpina, Scoparia	... 204	arcuosa, Chortodes (Miana)	215, 304
alsines, Caradrina	67, 158, 160, 215, 304	areola (lithorhiza), Xylocampa	214, 316
alternana, Sericoris	... 52	argentella, Elachista	... 112
althaea, Spilothyrus	... 224	argentula, Banksia	... 293
Alucita	... 179	argiades, Everes (Lycaena)	214, 220, 300
alveus, Syricthus	... 224	ab. coretas	... 223
amataria, Timandra	... 158	argiolus, Cyaniris (Lycaena)	158, 162, 214, 219, 220, 223, 300, 302
amathusia, Argynnis	50, 223	argus, Plebeius (Lycaena)	127, 128, 129, 223
ambigua, Caradrina	95, 215, 283, 293, 314	ab. argyrognomon	... 129
ambigualis, Scoparia	14, 83, 189, 204, 216	Argynnidæ	... 283
americana, Acronycta (Apatela)	59, 146, 295	Argynnidæ	... 11, 301
Amorpha	... 56	Argynnis	... 118, 283, 284, 301
Amphidasidae	... 287	Argyresthia	... 200, 259
Amphipyra	... 320	arion, Lycaena	174, 187, 189, 214, 220, 223, 300
Amphipyridæ	... 168, 320	arundinis (typhae), Nonagria	... 143
anellus (bipunctatus), Meliosobolus	216	ab. fraterna	... 143
angularia, Eugonia vide quercinaria, E.	...	ashworthii, Agrotis	... 85, 86
angustalis, Cledeobia	... 71	Asteroscopus	... 215
angustana, Hypermoecia	...	astrarche, Polyommatus (Lycaena)	47, 50, 214, 220, 223, 262, 300
var. cruciana	... 257	ab. allous	... 223
angustella, Alispa	... 176	var. artaxerxes	... 93
angusticollis, Tischeria	... 156	atalanta (Pyrameis), Vanessa	3, 4, 11, 88, 90, 223, 301, 302
annulata, Zonosoma (Ephyra)	23, 95, 109	atmoriella (atmorella), Argyresthia	201, 259, 282
anomala, Stilbia	... 112, 152, 161	athalia, Melitaea	51, 52, 70, 228, 301
Anosia	... 301	atomalis, Scoparia	... 83
anthedon, Diadema	... 210	atomaria, Emturga	... 47
Anthocaridi	... 301	atropis, Hadenæ	... 91
Anthocarinæ	... 11	atropos, Acherontia	40, 86, 88, 112, 114, 120, 144, 149, 155, 166, 168, 175, 204, 207
Anticlea	... 61, 145	Attacus	... 247
antiopa, Euvanesca	52, 99, 150, 189, 223, 301, 313	augur, Noctua	... 94, 192
antiqua, Orgyia	46, 65, 255, 277, 303	aurago, Xanthia	130, 160, 161, 179, 206, 215
Anytus	... 57	aurantiaria, Hybernica	... 162, 184, 205
Apamea	... 137	auricoma, Acronycta	57, 59, 146, 147, 148, 240, 294, 296
Apameidi	... 287	var. pepili	... 294
Apameinæ	... 287	aurinia, Melitaea	16, 111, 140, 141, 159, 209, 230, 231, 301
Apatela	57, 58, 59, 145, 146, 148, 200, 294, 295, 297		
Apatelidæ	57, 146, 163, 295, 296, 297		
Apatura	... 301		
Apaturidi	... 301		

	PAGE		PAGE
<i>var. hibernica</i>	141, 142, 209, 210, 230, 231	Boletobiinae	... 287
<i>var. merope</i> ...	142, 209, 223, 231	Boletobiini	... 321
<i>var. ochrea</i> ...	... 143	Bombyces	... 277
<i>var. praeclara</i>	141, 142, 209, 230	Bombycides	13, 71, 96, 190, 229, 287, 303
<i>var. provincialis</i>	... 141	bombyliformis, Macroglossa	44, 57, 68, 69, 276
<i>var. signifera</i>	... 141, 142	Bombyx	... 152, 179
<i>var. scotica</i>	141, 209, 210, 230, 231	boreata, Cheimantobia	... 162
<i>var. virgata</i>	... 143	bractea, Plusia	... 160, 204, 206
australis, Aporophyla	... 293	brassicæ, Mamestra	47, 68, 94, 114, 120, 180, 215
autumnaria, Eugonia	... 176, 189	brassicæ, Pieris...	... 223, 301
autumnaria, Oporabia	291, 314, 315	Brenthis	... 117, 118, 284, 301
Aventia...	... 321	Brephos	... 318
aversata, Acidalia	... 158, 202	brevilinea, Leucania (Nonagria)	215, 293
<i>var. spoliata</i>	... 202	brumata, Cheimantobia	... 16, 278
badia, Notolophus (Orgyia)	... 277	brunnea, Noctua	... 14, 94
badiata, Anticlea	... 159	Bryophila	... 22, 287
baia, Noctua	94, 123, 215, 304	bucephala, Phalera	... 229, 303
bammakoo, Elymnia	... 321	Caberinae	... 287
banksiella, Epischia	... 116	caeruleocephala, Diloba	17, 206, 224, 295
barrettii (luteago), Luperina	190, 314	caesia, Dianthoecia	... 158, 180
basilinea, Apamea	... 93, 94, 303	caesiata, Larentia	... 14, 47, 266
basistrigalis, Scoparia	156, 176, 189, 216	caia, Arctia	7, 8, 13, 55, 66, 68, 120, 168, 189, 303
batis, Thyatira	... 63, 303, 309	Calasymbolus	... 57
bellana (penziana), Sciaphila	195, 196	c-album, Polygonia (Grapta)	86, 88, 89, 99, 115, 174, 223, 301
bellargus, Polymmatius (Lycaena)	41, 46, 90, 98, 119, 192, 214, 220, 223, 300	callidice, Pieris	... 223
belgaria, Scodion	... 67	Callophrys	... 213, 220, 300
betulae, Hyboma	... 296	callunae, Bombyx (Lasiocampa) vide quercus, B.	
betulae, Zephyrus (Thecla)	213, 219, 220, 300, 309	calthella, Eriocephala (Micropteryx)	95, 322
betularia, Amphidasys	22, 23, 27, 30, 31, 88, 181	cambrica (cambricaria), Venusia	14, 44, 61
<i>var. doubledayaria</i>	30, 31, 69, 181	camelina, Lophopteryx (Notodonta)	88, 288, 303
betulina, Fumea...	... 176, 189	camilla, Limenitis	... 223
bicolor (bicoloria), Notodonta (Drymonia)...	... 283, 288	campanulata, Eupithecia	... 249
bicolorana, Hylophila	... 214	<i>var. atraria</i>	... 249
bicolorata, Melanthia	... 14	candidata, Asthena	... 158
<i>var. plumbata</i>	... 14	candidulana, Catoptria	... 113
bicoloria, Miana	... 67, 303	caniola, Lithosia	... 185
bicuspis, Diceranura (Cerura)	73, 74, 75, 186, 190, 207, 288, 314	cannae, Nonagria	... 157, 175, 293
bidentata, Odontopera	... 93, 206	capsicola, Dianthoecia	15, 70, 93, 160, 305
bifida, Diceranura (Cerura)	... 66, 159, 288	capsophila, Dianthoecia	55, 179, 180, 181
BIRUCATÆ	... 96	Caradrina	... 177, 215
bilineata, Campptogramma...	51, 318	Caradrinidae	... 214, 287
<i>var. infusata</i>	... 313	carbonaria, Fidonia	... 93
<i>var. isolata</i>	... 313	carbonariella, Phycis vide fusca, P.	
bilunaria, Selenia	... 206, 316	cardamines, Euecloë	206, 214, 223, 301
bimaculata (taminata), Bapta	... 115	cardui, Pyrameis (Vanessa)	3, 11, 88, 110, 111, 116, 162, 171, 223, 301, 302
bipunctatus, Melissobaptis vide anellus M.		carmelita, Lophopteryx (Notodonta)	23, 288
bipunctaria, Eubolia	... 47, 51, 52	carnella, Ilythia vide semirubella, I.	
bipunctidaetylus, Mimaseoptilus	... 52	carniolica, Zygaena	... 21, 50
Bisulcia	58, 59, 146, 148, 240, 295, 297	carpinata (lobulata), Lobophora	159, 242
birdella, Phygadeuon	... 113	carpophaga, Dianthoecia	47, 160, 181, 206
biundularia, Tephrosia	41, 70, 131, 152, 192	Carterocephalus	... 300
blomeri, Asthena	... 44, 68	carthami, Syritthus	... 224
Boarmidae	... 287	castanea, Noctua...	92, 94, 160, 184
Boarmiinae	... 287	<i>var. neglecta</i>	... 94, 152, 161
boetica, Lampides (Lycaena)	11, 214		
	220, 300		
Boetobia	... 321		

## SPECIAL INDEX.

ix.

	PAGE
castaneae (arundinis), <i>Macrogaster</i>	44, 90, 144
castigata, <i>Eupithecia</i> ...	197, 249
castrensis, <i>Bombyx</i> ( <i>Clisiocampa</i> )	44, 85, 113, 163, 229
catalaunalis, <i>Ebulea</i> ...	318
Catocalinae ...	321
cecropia, <i>Samia</i> ...	42
celerio, <i>Choerocampa</i> 62, 87, 166,	167, 168, 175, 189, 240, 313
celtis, <i>Libythea</i> ...	223
cembrae, <i>Scoparia</i> ...	14
cenea, <i>Papilio</i> ...	210
<i>var. hippocoön</i> ...	210
<i>var. trophonius</i> ...	210
cengalensis, <i>Terias</i> ...	321
centonalis, <i>Nola</i> ...	144
Ceratonia ...	247
cerisii, <i>Copismerinthus</i> ...	56, 57
certata, <i>Eucosmia</i> ...	206, 258
Cerura ..	207, 235, 288
cerusellus, <i>Platytes</i> ( <i>Crambus</i> )	44, 89
cervinaria, <i>Eubolia</i> ...	120
cespitis, <i>Herbula</i> ...	14, 51
cespitis, <i>Luperina</i> 89, 152, 160, 185,	215
ceto, <i>Erebia</i> ...	223
chamomillae, <i>Cucullia</i> ...	70, 305
chaonia, <i>Notodonta</i> ( <i>Drymonia</i> )	288
charlonia, <i>Euchloë</i> ...	11
cheiranthi, <i>Pieris</i> ...	11
Chelonides ...	287
chenopodii, <i>Hadena</i> <i>vide</i> <i>trifolii</i> , H.	
chi, <i>Polia</i> ...	13, 94, 144, 214
<i>var. olivacea</i> ...	13, 143, 144
chlorana, <i>Earias</i> ..	67, 214
Choerocampa ...	247
Chortodes ...	287
christi, <i>Thymelicus</i> ...	11
chrysippus, <i>Danaüs</i> ...	11, 210
chrysisis, <i>Plusia</i> 14, 152, 160, 206,	305
chryson (orichalcea), <i>Plusia</i> ...	69
Chrysocorys ...	177
Chrysophanidi ...	214, 219, 220, 300
Chrysophanus ...	213, 214, 219, 220, 300
chrysidiformis, <i>Sesia</i> ...	299
chrysozona, <i>Hecatera</i> ...	215
chrysorrhoea, <i>Porthesia</i> ...	244, 303
Chytonix ...	295
Cidaria ...	287
ciliialis, <i>Nascia</i> ...	90, 91
ciliella (ciliaria), <i>Eupoecilia</i> ...	205
cinerea, <i>Agrotis</i> ...	69, 175, 293, 304
cingillella, <i>Elachista</i> ...	259
cinxia, <i>Melitaea</i> ...	244, 301
<i>ab. brunnea</i> ...	142
ciroe, <i>Satyrus</i> ...	224
circularis, <i>Mellinia</i> ( <i>Xanthia</i> ) 88, 89,	92, 94, 120, 159, 160, 161, 206,
215, 304	
circellata, <i>Acidalia</i> ...	260
citrago, <i>Xanthia</i> 43, 87, 148, 159,	161, 206, 215, 304
citrana, <i>Catoptria</i> ...	113
citralis (christiennella), <i>Hypercallia</i>	52
clathrata, <i>Srenia</i> ...	66

	PAGE
cleobule, <i>Gonepteryx</i> ...	11
c-nigrum, <i>Noctua</i> 13, 91, 94, 120, 206,	304
Cochliopodides ...	287
coenobita, <i>Catuna</i> ...	297, 321
coenosa, <i>Laelia</i> ...	144, 189, 313
Coenonympha ...	114, 301
Coenonymphidi ...	301
Colias ...	18, 301
colgounana, <i>Sciaphila</i> 130, 156,	194, 195, 196, 197, 205, 259
<i>ab. suffusa</i> ...	196
comes (orbana) <i>Tryphaena</i> 92, 94,	151, 153, 158, 161, 165, 283, 304
<i>var. curtisii</i> ...	166, 283
comma, <i>Leucania</i> ...	94, 303
comma, <i>Pamphila</i> 50, 51, 120, 224,	300, 309
complanata, <i>Lithosia</i> ...	51, 87, 88
compta, <i>Dianthoea</i> ...	317
concolor, <i>Nonagria</i> <i>vide</i> <i>extrema</i> ,	
<i>Tapinostola</i>	
confusa, <i>Noctua</i> 91, 135, 136, 137,	138, 139, 140, 155, 175, 177
conformis, <i>Xylina</i> <i>vide</i> <i>furcifera</i> , X.	
coniferana, <i>Stigmonota</i> ...	205, 280
conigera, <i>Leucania</i> ...	94, 158, 303
consortaria, <i>Boarmia</i> ...	61
conspersa, <i>Dianthoea</i> 15, 67, 93, 94,	221
<i>ab. suffusa</i> ...	221
conspersana, <i>Sciaphila</i> ( <i>Nephodesme</i> )	195
conspicillaris, <i>Xylomiges</i> 190, 215,	243, 293, 314
contaminana, <i>Teras</i> ...	189
contaminellus, <i>Crambus</i> ...	216
contigua, <i>Hadena</i> ...	46, 70, 215
contiguaria, <i>Acidalia</i> ...	95, 120, 145
convolvuli, <i>Sphinx</i> 42, 63, 84, 87,	89, 112, 116, 131, 135, 144, 152,
155, 156, 162, 166, 167, 168, 174,	184, 204, 226, 227, 240, 283, 299, 302
<i>Copismerinthus</i> ...	56, 57
cordigera, <i>Anarta</i> ...	215
corticea, <i>Agrotis</i> 47, 89, 94, 158, 192,	255
corydon, <i>Polyommatus</i> ( <i>Lycæna</i> )	41, 50, 187, 192, 214, 219, 220, 223,
300, 314	
coryli, <i>Demas</i> ...	224, 225, 226, 297
cosmodactyla, <i>Amblyptilia</i> ...	160
cosmophorana, <i>Coccyx</i> 192, 205,	235, 236, 280, 285
Cossus ...	6, 154, 155
costaestrigalis, <i>Hyphenodes</i> 89, 160,	206
costella, <i>Cerostoma</i> ...	90
Crambides ...	205
Crambinae ...	96
Craniophora ...	240, 295
crassa, <i>Agrotis</i> ...	255, 256
crataegana, <i>Tortrix</i> ...	233
crataegella, <i>Scoparia</i> ...	183
crataegi, <i>Aporia</i> 11, 51, 52, 223, 299,	301
crataegi, <i>Trichiura</i> ...	69, 246
crenata, <i>Glyphisia</i> ...	288
crepuscularia, <i>Tephrosia</i> 41, 70, 95,	159, 242, 316



	PAGE		PAGE
Cressonia ...	57	diffinis, Calymnia 67, 151, 158, 160,	
cribralis, Herminia ...	87, 90	161, 215, 304	
cribrella, Myelophila ...	44	Diloba ...	215
cribrum, Emydia ...	46, 70, 214	dilucidaria, Gnophos ...	52
var. candida ...	165	diluta, Asphalia ...	88, 183, 303
cristana, Peronea ...	314	dilutaria, Acidalia 124, 125, 126, 193,	258
var. curtisana ...	314	dilutata, Oporabia 157, 218, 232, 260,	
cristulalis, Nola ...	69	289, 290, 291, 314, 315	
croceago, Hoporina 4, 215, 242, 243,		vars. autumnaria and polata ...	291
279, 304		dipsacea, Heliothis ...	44, 90, 95
cucubali, Dianthoecia ...	206, 304	dispar, Chrysophanus 145, 189, 214,	
cuculla (cucullina), Lophopteryx ...	288	220, 286, 283, 300, 313	
cucullata (sinuata), Anticlea 61, 145		dispar, Oneria ...	120
Cucullia ...	214	disparata, Eupithecia ...	109
culiciformis, Sesia ...	22, 95	dissimilis (suasa), Hadena 113, 153, 215	
eulmellus, Crambus ...	90	var. confluent ...	290
cultraria, Drepana ...	90	ditrapezium, Noctua ...	69
cucullatella, Nola ...	303	dolobrararia, Eurymene ...	22
Cupido ...	220, 300	dominicanus, Amauris ...	210
cursoria, Agrotis 94, 161, 162, 165, 191		dorilis, Polyommatus ...	223
Cuspidia 57, 58, 59, 146, 148, 199, 294,		dorippus, Danais	
296, 297		var. klugii ...	11
cuspidis, Triaena ...	294	dotata (associata), Cidaria ...	93
Cyaniris ...	220, 300	Drepanulides ...	287
Cyclopidi ...	300	dromedarius, Notodonta ...	88, 288
cynthia, Melitaea ...	209, 222, 223	Dryas ...	284, 301
cynthia, Philosoma ...	42	Drymonia ...	288
dactylina, Apatela (Megacronycta) ...	295	dubitalis, Scoparia ...	204
dahlia, Noctua 88, 89, 92, 94, 159, 160,		dumetellus, Crambus ...	204
232, 233, 304		duplana, Retinia ...	15
Danaidae ...	210	duplaris, Cymatophora 14, 68, 88, 89, 160	
Danaidi ...	301	echeria, Amauris ...	210
Danainae ...	301	edusa, Colias 11, 18, 47, 48, 50, 67,	
daphne, Argynnis ...	223	83, 84, 86, 90, 116, 161, 162, 166,	
dapiidice, Pieris 11, 98, 166, 174, 301, 313		174, 192, 210, 223, 234, 250, 251,	
Dasydiinae ...	287	252, 253, 300, 301, 302	
Dasyptia ...	215	var. helice ...	11, 47, 87, 251, 302
davus, Coenonympha vide typhon, C		egeria, Pararge ...	89, 214, 224, 301
dealbata, Scoria vide lineata, S.		electa, Catocala ...	236, 283, 314
decolorata, Emmelesia ...	206	elinguaris, Crocallis ...	14, 66, 206
decrepitalis, Scopula ...	14	elipenor, Choerocampa 47, 67, 230,	
defoliaria, Hybernia 66, 143, 162, 168,		246, 247, 248	
184, 202, 205, 233, 262, 278, 315		elymi, Tapinostola (Nonagria) 71, 94, 215	
Deilephila ...	167	Endromis ...	247, 287
delius, Parnassius ...	223	Ennomidae ...	287
Deltoides ...	287, 321	Ennominae ...	287
Demas ...	224, 297	Enodia ...	301
denotata, Eupithecia vide campanulata, E.		Epermenia ...	177, 270
dentina, Hadena ...	93, 94, 215	ephemeraeformis, Thyridopteryx 67,	
Depressaria ...	4, 242	71, 118, 121, 122	
depuncta, Noctua 89, 92, 112, 119,		Ephyrinae ...	287
160, 175		Epinephele ...	301
derasa, Gonophora (Thyaytra) 159,		Epinephelidi ...	301
206, 303, 309		epiphron, Erebia ...	70, 100, 301
designata, Coremia ...	14	var. cassiope ...	17, 89
Dianthoecia ...	287, 305	Eraniinae ...	287
Dicranuridae ...	288	Erebia ...	51, 52, 60, 114, 301
dictaea, Notodonta (Leiocampa) 206, 288		Erebiinae ...	301
dictaeoides, Notodonta (Leiocampa) 88, 288		ericellus, Crambus ...	17
dictynna, Melitaea ...	223	ericetaria (plumaria), Selidosema 65, 260	
Dicycla ...	123	ericetata, Emmelesia vide minorata, E.	
didyma (oculea), Apamea 94, 223, 303		Eriocephala ...	96
didymata, Larentia ...	26, 93	Eriocephalidae ...	96
		Eriocephalides ...	96, 287

	PAGE
Erycinidae ...	213
erythrocephala, Orrhodia 123, 190,	
242, 280, 293, 317, 318	
Eucheliidae ...	100
Euchloë ...	214, 240, 301
Eugonia ...	301
Eulonche ...	296
eumedon, Lycæna ...	223
euphorbiae (myricae), Acronycta	
(Viminia) 13, 51, 147, 148, 240,	
284, 294, 296	
var. montivaga ...	294
euphorbiae, Deilephila 10, 135, 166,	
167, 168	
euphrasiae, Acronycta 57, 59, 147,	
148, 294	
euphrosyne, Brenthis (Argynnis)	
43, 217, 223, 284, 301	
Eupithecia ...	109, 197, 198, 236
Eupitheciinae ...	287
Eupterotidae ...	163
euryale, Erebia ...	51, 2, 22, 224
Eusmerinthus ...	57
Eutoreuma ...	58
Euvænassa ...	150, 301
Everes ...	220, 300
excaecutus, Paonias ...	56, 57
exclamationis, Agrotis 16, 94, 255, 304	
exigua, Laphygma ...	190, 314
exiguata, Eupithecia ...	158
exoleta, Calocampa 92, 94, 159, 160,	
162, 214, 279	
extersaria, Tephrosia vide luridata, T.	
extrema, Tapinostola ...	190, 215
exulans, Zygaena ...	67, 176
var. vanadis ...	67
exulis, Crymodes 91, 112, 130, 175,	
215, 233, 314	
fagi, Stauropus ...	130, 160, 298
falcatoria (falcula), Drepana (Platy-	
pteryx) ...	88, 303
falsellus, Crambus ...	160
farrella, Episehnia ...	162
fascelina, Dasychira ...	14
fasciana, Erastria ...	22, 95, 305
fasciuncula, Miana ...	70, 303, 304
fatidica, Agrotis ...	255
felina, Apatela (Megacronicta) ...	295
Feltia ...	255
fenestrella, Endrosis ...	88
feronia, Angeronia ...	150
ferrugata, Coremia ...	109, 120, 250
var. confixaria ...	250
festiva, Noctua 27, 92, 94, 135, 136,	
137, 138, 139, 140, 158, 166, 175,	
177, 192, 304	
festucae, Plusia ...	66
Fidoniidae ...	287
Fidoniinae ...	287
fligrammaria, Oporabia 260, 289,	
291, 292, 314, 315	
ab. intermedia ...	289
ab. melana ...	289
ab. pallida ...	289

	PAGE
ab. typica ...	289
ab. virgata ...	290
filipendulae, Zygaena 20, 93, 255, 305	
fimbria, Triphaena 66, 88, 89, 90,	
94, 160, 215	
fissipuncta, Dyschorista ...	65
flammea, Meliana ...	66, 90, 293
flammealis, Endotricha ...	185
flavago, Xanthia 88, 94, 159, 161,	
183, 206, 215, 304	
flavicincta, Polia 86, 159, 206, 214, 321	
flavicornis, Asphalia (Cymatophora)	
161, 316, 318, 321	
flexula, Aventia ...	321
fluctuata, Melanippe	
var. incanata ...	250
var. virgata ...	250
fluctuosa, Cymatophora 68, 89, 113, 303	
formicaeformis, Sesia ...	161
fovea, Thecophora ...	150
fraxini, Catocala 43, 62, 115, 116,	
175, 240, 283, 314	
FRENATAE ...	71, 96, 149
fuciformis, Macroglossa ...	57, 276
fuliginaria, Boletobia ...	236, 321
fuliginosa, Spilosoma 13, 14, 66, 93	
fulva, Tapinostola 66, 89, 152, 215	
fulvago (cerago), Xanthia 89, 94, 95,	
159, 161, 183, 206, 215, 231, 232, 281,	
304	
var. aurantia ...	231, 232, 281
var. cerago ...	231
var. flavago ...	95
var. flavescens 89, 92, 95, 231,	
232, 281	
var. fulvago ...	231, 232
var. imperfecta ...	231
var. obsoleta ...	231
var. suffusa ...	231, 232, 281
var. virgata ...	231, 281
fulvata, Cidaria ...	23
fumata, Acidalia ...	15
funeralis, Acronycta (Hyboma) 146, 296	
furcatellus, Crambus ...	17, 205
furcifera (conformis), Xylina 16, 185,	
214, 279, 314	
furcula, Diceranura (Cecura) 74, 288	
furva, Mamestra 89, 91, 92, 158, 161	
fusca, Phycis ...	205
fuscantaria, Eugonia ...	66
galactodactyla, Acipitilia ...	160
galatea, Melanargia 50, 114, 223, 301	
galata, Melanippe ...	47
galii, Deilephila 135, 144, 166, 167, 168	
gamma, Plusia 27, 120, 159, 234, 305	
gausope, Romaleosoma ...	321
gemina, Apamea ...	14, 94, 303
geminatus, Eusmerinthus ...	57
gemmae (rhomboidaria), Boarmia	
14, 119, 245	
genistae, Hadenia ...	60, 158, 215
Geometridae ...	71, 287
Geometrides 44, 176, 190, 248, 287, 321	
Geometrinae ...	287

	PAGE		PAGE
geryon, Procris (Ino) ...	44, 158	hera, Callimorpha 46, 97, 98, 99, 100,	
gilvago, Xanthia 86, 88, 89, 113, 120,		144, 163, 173, 174, 175, 185, 187, 299	
153, 160, 161 186, 215		<i>ab. lutescens</i> ...	99, 163
gilvicomana, Eupoecilia ...	283, 314	herbariata, Acidalia ...	317
glacialis, Erebia ...	222	herbosana, Dicrorhampa ...	205
<i>var. pluto</i> ...	222	hermione, Satyrus ...	224
glareosa, Noctua 89, 91, 92, 94, 130,		hero, Papilio ...	103, 104
152, 159, 160, 184, 188, 221, 260		Hesperidae ...	213, 300
<i>var. hebraica</i> ...	221	Hesperides ...	11, 300
<i>var. rosea</i> ...	221	Hesperidi ...	300
<i>var. suffusa</i> ...	145, 175, 221	hesperidis, Euchloe (Anthocaris) ...	186
glauca, Hadenia ...	215	Hesperinae ...	300
glauca (spinula), Cilix ...	66, 303	hexadactyla, Alucita (Ornoides) ...	268
glauconalis, Pyralis ...	67	Hipparchia ...	114, 301
Glossata ...	96	Hipparchiidi ...	301
Gluphisia ...	288	hippotoe, Polyommatus ...	223
glyphica, Euclidia ...	44, 159	<i>var. eurybia</i> ...	223
gnaphalii, Cucullia 130, 175, 190, 278,		hirtaria, Biston ...	28, 30, 70
283, 314		hispidaria, Nyssia 278, 285, 316, 320, 323	
Gonepteryx ...	301	hispidus, Heliophobus ...	112, 293
gonodactyla, Platypilia ...	160	holosericata (dilutaria), Acidalia	
gorge, Erebia ...	222, 223	124, 125, 126, 193, 194	
<i>var. triopes</i> ...	222, 223	humiliata, Acidalia 51, 52, 124, 125,	
gothica, Taeniacampa 13, 93, 159, 165,		126, 145, 234, 293	
192, 206, 220, 242, 279, 304, 316		humuli, Hepialus 42, 93, 111, 112,	
<i>var. gothicina</i> ...	93, 165, 220	180, 165, 305	
<i>ab. obsoleta-rufescens</i> ...	220	<i>var. hethlandica</i> ...	91, 144, 165
<i>ab. obsoleta-variegata</i> ...	220	hyale, Colias 19, 48, 50, 52, 174, 223, 301	
gracilis, Taeniacampa 23, 159, 192,		Hybernidae ...	279, 287
242, 243		Hyberninae ...	287
graminis, Charaeas 14, 66, 94, 152		Hyboma ...	59, 294, 295, 296, 297
graslini, Agrotis ...	255	hyemana, Tortricodes ...	316
grata, Eudryas ...	199	hylas, Lycaena ...	223
grisea, Hyboma ...	296	hyperanthus, Epinephele 114, 224,	
grisealis, Zanclognatha ...	305	258, 260	
griseata, Lithostegia ...	44, 90	<i>var. arete</i> ...	160
griseola, Lithosia ...	158	hyperborea (alpina), Pachnobia 215, 314	
grossulariata, Abraxas 13, 257, 283, 313		Hypsa ...	150
Hadenia ...	287	iacobaeae, Euchelia 47, 93, 156,	
Hadenidi ...	287	205, 206, 214, 303	
hamamelis, Hyboma ...	296	ianira, Epinephele 11, 40, 50, 71,	
hamellus, Crambus ...	162	100, 114, 192, 208, 217, 224, 258,	
harpagula (sicula), Drepana (Platy-		301, 302	
pteryx) ...	190, 314	<i>var. hispulla</i> ...	11, 41
Harrisimemna ...	57	<i>var. illustris</i> ...	41
hastata, Melanippe ...	69	<i>var. iurtina</i> ...	100
haworthii, Celaena 79, 80, 89, 94, 120		ianthina, Tryphaena ...	304
<i>var. hibernica</i> ...	80	icarus (alexis), Lycaena 23, 47, 51,	
<i>var. morio</i> ...	80	95, 192, 214, 220, 223, 262, 298,	
hectus, Hepialus ...	14, 23	300, 302	
Heliophobus ...	215	<i>var. icarinus</i> ...	223
Heliopsis ...	215	icterana, Tortrix <i>vide</i> paleana, T.	
hellmanni, Tapinostola 66, 91, 215, 275		ilicifolia, Lasiocampa ...	189, 283, 313
helveticaria, Eupithecia ...	15	illuminatella, Argysthia ...	200, 201
<i>var. arceuthata</i> ...	15	imitaria, Acidalia ...	158
helvola (rufina), Anchocelis 92, 94,		immanata, Cidaria ...	159
159, 162, 215		impar, Bryophila <i>vide</i> muralis, B.	
Hemaris ...	57	implicata, Melanippe <i>vide</i> montanata, M.	
Heodes ...	220	impressa, Pharetra ...	296
hepatica, Xylophasia ...	151, 159, 206	impudens, Leucania ...	66, 90
Hepialidae ...	95	impura, Leucania ...	70, 94, 303
Hepialides ...	71, 149, 287	incerta, Taeniacampa 13, 23, 93, 159,	
Hepialus ...	6, 95, 149	192, 242, 279, 304, 316	
		INCOMPLETAE 48, 107, 176, 211, 287, 305	

	PAGE		PAGE
infusca, Caradrina ...	260	leucophaearia, Hybernia 13, 162,	
ino, Argynnis ...	222, 223	168, 218, 233, 241, 278, 279, 281,	
inornata, Acidalia ...	89	284, 316	
inornata, Coenonympha ...	107	Leucophasia ...	214, 240, 301
instabilella, Lita ...	116	leucostigma (fibrosa), Apamea (Helo-	
instabilis, Taeniocampa <i>vide</i> incerta, T.		trophia) ...	66, 91
interjecta, Tryphaena ...	66, 120, 215	levana, Vanessa ...	55
interjectaria, Acidalia 124, 125, 126, 234		libatrix, Gonoptera (Scoliopteryx) 4,	
interrogationis, Plusia ...	47, 89, 185	66, 67, 90, 242, 305	
io, Vanessa 3, 4, 55, 90, 99, 173, 223,		lichenaria, Cleora ...	120, 160, 315
301, 302		lichenaea, Epunda ...	112, 214, 293
iota, Plusia 14, 152, 160, 185, 206		ligea, Erebia ...	51, 224
iphis, Hipparchia ...	104, 107	Liginae ...	287
irregularis (echii), Dianthoecia ...	67	ligniperda, Cossus ...	305
irriguana, Sericoris ...	205	ligula, Orrhodia (Cerastis) 89, 162,	
iris, Apatura 4, 52, 64, 65, 174, 301, 309		209, 242, 279, 304	
irrolella, Setina ...	22, 23, 51	ligustri, Acronycta (Bisulcia) 58, 68,	
		146, 148, 199, 295, 296	
jaculifera, Agrotis (Agronoma) ...	256	ligustri, Sphinx 226, 227, 247, 248, 302	
jamaicensis, Eusmerinthus ...	57	limacodes, Heterogenea ...	71
jasioneata, Eupithecia ...	176, 197	Limnitis ...	301
Jochaeaera ...	57, 58, 59, 294, 296	limitata, Eubolia ...	51, 93
JUGATAE ...	71, 149	linearia, Zonosoma (Ephyra) ...	44
juglandis, Cressonia ...	57	lineata (livornica), Deilephila 166,	
juniperata, Thera ...	119, 165	167, 175, 313	
		lineata (dealbata), Scoria 22, 69, 95, 293	
klemannella, Lithocolletis ...	44	lineola, Thymelicus (Pamphila) 18,	
knaggsiella, Lita (Gelechia) ...	41	51, 52, 64, 87, 192, 300	
kühniella, Ephestia ...	63, 68, 71	Liparidae ...	225, 226, 228, 297
		Liparis ...	225, 247
lambda (zinckenii), Xylina 126, 127,		Lita ...	116
165, 175, 214, 283, 317, 318		literana, Leptogramma ...	316
var. somniculosa ...	127	litterosa, Miana ...	94, 303
Lampides ...	220, 300	lithargyria, Leucania ...	94, 179, 303
lancealis, Botys ...	205	Lithocolletis ...	44
lanestrus, Eriogaster ...	16	Lithosia ...	214
lantanaella, Lithocolletis ...	23	Lithosiidae ...	100
lapidata, Phibalapteryx ...	14, 16, 113	lithospila, Hyboma ...	296
lappona, Erebia ...	222, 223	lithoxylea, Xylophasia ...	94, 206, 303
lappitaria, Nyssia 41, 145, 176,		littoralis, Leucania ...	16, 47, 94
283, 313, 323		littorana, Sericoris ...	205
Larentia ...	27	litura, Anchocelis 88, 89, 92, 94, 206,	
Larentiidae ...	248, 287, 289, 314	215, 304	
Larentiinae ...	287	liturata, Macaria ...	44
lariciata, Eupithecia ...	44, 93	lobeliae, Hyboma ...	296
Lasiocampa ...	248	Lobophorinae ...	287
latistrius, Crambus ...	162	lobulata, Lobophora <i>vide</i> carpinata, L.	
latona (lathonia), Argynnis 11, 52,		Loeosopsis ...	187
174, 189, 223, 238, 284, 301, 318		loniceræ, Zygaena ...	50
Leiocampa ...	288	Lophopteryx ...	288
lemnata, Cataclysta ...	66, 68	Lophostethus ...	247
Lemoniidae ...	300	lorquiniana (uliginosana), Dictyop-	
Lepito ...	59	teryx ...	14
Lepitorea ...	296	lota, Orthosia 94, 120, 159, 206, 215, 304	
leporina, Acronycta (Cuspida) 57, 58,		lubricipeda, Spilosoma 23, 46, 144,	
59, 88, 294, 295, 297		189, 303, 323	
var. bradyporina ...	294	var. fasciata ...	46
lepusculina (populi), Apatela (Mega-		var. radiata ...	46
cronicta) ...	295	lucens, Hydroecia 78, 79, 118, 120, 260	
leucographa, Pachnobia 23, 44, 215,		var. grisea ...	78
242, 243, 279, 292		var. pallida ...	78
leucophaea, Pachetra 69, 175, 215,		var. rufa ...	78, 79
293, 317		sub-var. grisea-albo ...	78
		sub-var. grisea-flavo ...	78
		sub-var. lucens-albo ...	79

	PAGE		PAGE
<i>sub-var. lucens-flavo</i> ...	59	<i>maturna, Melitaea</i> ...	142, 222, 223
<i>sub-var. pallida-albo</i> ...	78	<i>maura, Mania</i> ...	90, 304, 320
<i>sub-var. pallida-flavo</i> ...	78	<i>var. virgata</i> ...	320
<i>sub-var. rufa-albo</i> ...	79	<i>mavins, Amauris</i> ...	210
<i>sub-var. rufa-flavo</i> ...	79	<i>medesicaste, Thais</i> ...	82
<i>lucernea, Agrotis</i> 112, 161, 185, 186,		<i>var. honoratii</i> ...	82
192, 233, 293		<i>medicaginis, Zygaena</i> ...	50
<i>lucina, Nemeobius</i> ...	189, 300	<i>megacephala, Acronycta</i> 58, 59, 120,	
<i>lucipara, Euplexia</i> ...	305	146, 148, 294, 296, 297, 303	
<i>luctuosa, Acontia</i> 15, 22, 67, 90, 95,		<i>Megacronycta</i> ...	58, 295
185, 293		<i>megaera, Pararge</i> 51, 214, 224, 301,	302
<i>ludifica, Diphthera</i> ...	297	<i>Melampias</i> ...	301
<i>lunaris, Ophiodes</i> 190, 283, 317, 318		<i>melampus, Erebia</i> ...	223
<i>lunigera, Agrotis</i> ...	112, 293	<i>Melanchra</i> ...	215
<i>lunosa, Anchocelis</i> 89, 113, 158, 159,		<i>Melanargia</i> ...	114, 301
160, 206, 215, 304		<i>Melanippe</i> ...	249
<i>lupulinus, Hepialus</i> ...	93, 305	<i>melanopa, Anarta</i> ...	215
<i>luridata (extersaria), Tephrosia</i> ...	68	<i>melas, Erebia</i> ...	222, 223
<i>lurideola, Lithosia</i> ...	51, 160, 303	<i>maleager, Lycaena</i> ...	98
<i>lutarella (pygmaeola), Lithosia</i> 51,	216	<i>Melitaea</i> ...	230, 301
<i>lutealis, Scopula</i> ...	14	<i>Melitaeidi</i> ...	301
<i>luteata, Asthena</i> ...	43, 44	<i>mendica, Noctua vide festiva, N.</i> ...	136
<i>luteicoma, Pharetra</i> ...	296	<i>mendica, Spilosoma</i> 23, 75, 76, 77	
<i>luteolata (crataegata), Rumia</i> 67, 69		78, 144, 159	
<i>lutosa, Calamia</i> 120, 215, 237, 270,		<i>var. clara</i> ...	76, 77
271, 272, 273, 274, 275, 303		<i>var. inversa</i> ...	77
<i>ab. cannae</i> ...	273, 274, 275	<i>var. mixta</i> ...	76, 77
<i>ab. crassicornis</i> ...	273, 274, 275	<i>var. mus</i> ...	76
<i>ab. pilicornis</i> ...	273, 274, 275	<i>var. rustica</i> ...	75, 76, 77, 144
<i>ab. rufescens</i> ...	273, 274	<i>var. standfussi</i> ...	76, 77
<i>ab. rufescens-suffusa</i> ...	273, 274	<i>mendocino, Saturnia</i> ...	42
<i>lutulenta, Epunda (Aporophyla)</i> 89,		<i>menetriesii, Caradrina</i> ...	260
119, 158, 160, 161, 165, 215		<i>menthastri, Spilosoma</i> 7, 12, 40, 55,	
<i>var. luneburgensis</i> ...	119	71, 75, 93, 95, 143, 144, 189,	303
<i>var. sedi</i> ...	119	<i>var. radiata</i> ...	189
<i>Lycaena</i> 128, 213, 214, 219, 220, 300		<i>menyanthidis, Acronycta</i> 59, 146, 147	
<i>Lycaenida</i> ...	11, 300	148, 166, 294, 296, 297	
<i>Lycaenidae</i> ...	11, 187, 212, 213,	<i>mercurella, Scoparia</i> ...	183
223, 300		<i>mercuriana (monticolana), Pamplusia</i> 156	
<i>Lycaenidi</i> ...	214, 219, 220, 300	<i>meriones, Papilio</i> ...	210
<i>Lycaeninae</i> ...	11, 300, 314, 320	<i>Merolonche</i> ...	58
<i>lycaon, Epinephele</i> ...	50, 224	<i>merope, Papilio</i> ...	210
<i>Lycus</i> ...	220	<i>meticulosa, Brotholomia (Phlogophora)</i>	
<i>Lymantriidae</i> ...	224, 225	159, 305, 316, 318	
<i>lysimon, Lycaena</i> ...	11	<i>Metrocampidae</i> ...	287
<i>Macariinae</i> ...	287	<i>mi, Euclidia</i> ...	159, 305
<i>machaon, Papilio</i> 15, 61, 67, 95, 144,		<i>miata, Cidaria</i> ...	4, 89, 159
184, 223, 255, 300		<i>micacea, Hydroecia</i> 66, 94, 159, 192,	
<i>macilentia, Orthosia</i> 92, 94, 159, 160,		206, 215, 303	
162, 206, 215		<i>Microdonta</i> ...	288
<i>Macroglossa</i> ...	247	<i>Micropterygides</i> ...	71, 149
<i>maera, Pararge</i> ...	51, 224	<i>Micropteryx</i> ...	140, 322
<i>maia, Argynnis</i> ...	11	<i>Mimas</i> ...	56
<i>malvae, Syritheus</i> ...	162, 224, 300	<i>miniata, Calligenia</i> ...	185, 214
<i>var. taras</i> ...	162	<i>minima, Cupido (Lycaena)</i> 51, 214,	
<i>Mamestra</i> ...	287	220, 223, 300	
<i>margaritaria, Metrocampa</i>	206	<i>miniosa, Taeniocampa</i> ...	95, 242, 292
<i>margaritellus, Crambus</i> ...	205	<i>ministrana, Tortrix</i> ...	205
<i>marginaria, Hybernia</i> 13, 30, 163,		<i>minorata (ericetata), Emmelesia</i> ...	14
206, 210, 279, 316		<i>minos, Zygaena</i> ...	20
<i>maritima, Senta</i> ...	293	<i>minutata, Eupithecia</i> ...	88, 197
<i>Mastiphanes</i> ...	58, 296	<i>Miselia</i> ...	215
<i>matura (cytherea), Cerigo</i> 46, 153,		<i>missippus, Diadema</i> ...	191, 210
160, 215, 303		<i>mnestra, Erebia</i> ...	223
		<i>modesta, Triptogon</i> ...	57

	PAGE		PAGE
moeniata, Eubolia	... 51	<i>var. scotana</i>	... 205
monacha, Psilura	... 189, 261	noctivaga, Pharetra	... 296
moneta, Plusia	60, 68, 84, 175, 240	Noctua	27, 137, 225, 269, 276, 277
monodactylus, Pterophorus	4, 152	Noctuæ	... 27, 225, 226, 277
monoglypha (polyodon), Xylophasia	88, 91, 94, 113, 303	Noctuidæ	... 57, 224, 277
<i>var. infuscata</i>	... 14	Noctuides	13, 22, 94, 175, 190, 214, 269, 275, 287, 296, 297, 305
montanata, Melanippe	... 43, 93, 119	Noctuinae	... 287
<i>var. degenerata</i>	... 249	Nola	... 189, 214
<i>var. lapponica</i>	... 250	Nomiades	... 220, 300
monticolana, Pamplusia <i>vide</i> mercuriana, P.		Nonagria	... 215
morpheus, Caradrina	... 215, 304	notha, Brephos	... 243
mori, Bombyx	... 84	Notodonta	... 229, 247, 288
morrisii, Chortodes	... 215	Notodontidae	... 226, 288
morula, Hyboma	... 296	Notodontinae	... 288
muconella, Theristis	... 183	Notolophus	... 277
multistrigaria, Larentia	... 93, 316	nova, Notolophus (Orgyia)	... 277
munda, Taeniocampa	23, 160, 192, 242, 316	nubeculosa, Asteroscopus	... 292
mundana, Nudaria	... 14, 214	nupta, Catocala	... 67, 90, 305
munitata, Coremia	... 14, 176	nymphaeata, Hydrocampa	... 68
muralis, Bryophila	... 22, 303	Nymphalidae	... 11, 43, 213, 301
<i>var. impar</i>	... 22, 61, 144	Nymphalidi	... 301
murana, Scoparia	... 204	Nymphalinae	... 11, 301
muricata, Hyria	... 95	obelisca, Agrotis	... 92, 175, 185
murinata, Minoa	... 158	obesa, Agrotis	... 255
musculosa, Synia	215, 283, 293, 317, 318	obfuscaria (obfuscata), Dasydia	... 52
myellus, Crambus	... 130	oblinita, Acronycta	... 59, 296
mylitta, Antheraea	... 59, 262	obliterata, Eupisteria	... 43
myopiformis, Sesia	... 46, 305	oblongata (centaureata), Eupithecia	90
myops, Calasymbolus	... 57	obscura, Agrotis	65, 66, 89, 91, 112, 145, 158
myricæ, Acronycta <i>vide</i> euphorbiae, A.		<i>var. bigramma</i>	... 88
myrtilana, Phoxopteryx	... 205	obscuraria (obscurata), Gnophos	152, 185, 260
myrtilli, Anarta	88, 93, 215, 267	obsoleta, Leucania	... 44, 175, 293
nana, Dianthoecia <i>vide</i> conspersa, D.		OBTECTÆ	... 107, 246, 287
nanata, Eupithecia	... 88, 267	occidentalis, Acronycta (Hyboma)	146, 296
napi, Pieris	206, 223, 301, 302	occulka, Aplecta	... 92, 161
<i>var. bryoniae</i>	... 223	ocellaris, Xanthia	89, 123, 130, 157, 166, 175, 215
nebulosa, Aplecta	... 215	ocellata, Melanthia	... 93
Nemeobiidi	... 300	ocellatella, Lita <i>vide</i> instabilella, Lita	
Nemeobiinae	... 300	ocellatus, Smerinthus	56, 57, 70, 247, 248, 302
Nemeobius	... 300	ocellatus-populi (hybrid), Smerinthus	175
nemetes, Neptes	... 321	ochracea, Gortyna	... 71, 89, 303
memorivagana, Coccyx	... 280	ochrearia, Aspilates	... 67
Nepticulæ	... 130	octogesima (ocularis), Cymatophora	160, 320
nerii, Choerocampa	... 166, 167, 168	Odontoperinae	... 287
nerine, Erebia	... 52, 223	oeme, Erebia	
neurica (arundineti), Nonagria	61, 145	<i>var. spodea</i>	... 223
neustria, Bombyx (Clisiocampa)	159, 246	oleracea, Hadena	43, 47, 94, 215, 260, 305
ni, Plusia	... 204, 314	olivata, Larentia	14, 47, 52, 89, 185
nictitans, Hydroecia	14, 78, 79, 88, 94, 100, 159, 160, 303	omieronaria, Ephyra <i>vide</i> annulata, Zonosoma	
nigra, Epunda	89, 92, 94, 158, 159, 161, 184, 215	ononaria, Aplasta	... 317
nigricans, Agrotis	66, 67, 91, 94, 304	oo, Dicycla	... 215
nigrocincta, Polia	... 44	ophiogramma, Apamea	63, 65, 70, 113, 119, 160, 183, 271, 303
nigrofasciaria (derivata), Anticlea	... 206, 279	opima, Taeniocampa	... 69
niobe, Argynnis	... 50, 223, 318	Oporabia	... 314
<i>var. eris</i>	... 223	opthalmicus, Copismerinthus	56, 57
nisella (nisana), Grapholitha	... 14	optilete, Lycaena	... 223
Nisoniades	... 300		
piveana, Leptogramma	...		

	PAGE		PAGE
or, Cymatophora ...	68	parthenie, Melitaea ...	223
orbicularia, Zonosoma (Ephyra) ...	44	pastinum, Toxocampa ...	160, 162
orbitulus, Lycaena ...	222, 223	pavonia (carpini), Saturnia ...	42, 70,
Orgyia ...	224, 296	71, 93, 230, 238, 247, 248	
orientalis, Acronycta ...	59	pedaria, Phigalia ...	13, 161, 206, 234,
orion, Moma (Diphthera) ...	297	241, 262, 278, 285, 316, 323	
ornata, Acidalia ...	22, 23, 47, 51	peltigera, Heliothis ...	85
Orneodes ...	177, 270	pendularia, Zonosoma ...	47
ornithopus, Xylina ...	61, 86, 89, 160,	pennaria, Himera ...	160, 168
162, 214, 242, 279		penziana, Sciaphila ...	194, 195, 196,
Ortholithinae ...	287	197, 205	
Orthosia ...	215, 225	peregrina, Hadenia ...	283, 317
osseana (pratana), Aphelia ...	156	Peridroma ...	285
osseata, Acidalia ...	124	perla, Bryophila ...	22, 23, 71, 119, 303
ostrina, Thalpocharis ...	317	perlellus, Crambus ...	44, 205
ovata, Hyboma ...	296	var. warringtonellus ...	205
oxyacanthae, Miselia ...	94, 156, 159,	persicariae, Mamestra ...	215, 303
160, 161, 221, 305		petasitis, Hydroecia ...	192, 215
var. capucina ...	160, 161	perochraria, Acidalia ...	313, 317
var. pallida ...	221	Phalaenoides ...	57
Pachnobia ...	23, 123	Phaetrea ...	57, 58, 146, 148, 240, 294,
padellus, Hyponomeuta ...	113	296, 297	
padiformis, Pseudospiris ...	192	phegea, Syntomis ...	189
palaemon, Carterocephalus ...	222, 300	phicomone, Colias ...	19, 222, 223
palaeno, Colias ...	19	Philorgyia ...	296
paleacea (fulvago), Cosmia ...	92, 189, 215	Phlegethontius ...	57
pales, Argynnis ...	222, 223	phloea, Chrysophanus ...	10, 11, 68, 90,
var. napaeae ...	222, 223	93, 112, 116, 189, 214, 220, 223,	
palleana (icterana), Tortrix ...	16	300, 302	
pallens, Leucania ...	70, 91, 94, 303	phoebe, Melitaea ...	223
pallidicoma, Phaetrea ...	296	phragmitellus, Chilo ...	113
palpina, Pterostoma ...	66, 67, 68, 90,	phragmitidis, Leucania ...	56, 91, 245
160, 288		Phycidae ...	164
paludis, Hydroecia ...	78, 79, 88, 118, 120	picata, Cidaria ...	185
var. brunnea ...	78, 79	piceana, Tortrix ...	41
var. intermedia ...	79	Pieridae ...	11, 48, 212, 213, 240, 300
sub-var. brunnea-albo ...	79	Pieridi... ...	301
sub-var. brunnea-flavo ...	79	Pierinae ...	11, 300
sub-var. brunnea-rufa ...	79	Pieris ...	240, 301
sub-var. intermedia-albo ...	79	pigra, Pygaera ...	67
sub-var. intermedia-flavo ...	79	pinastri, Sphinx ...	60, 131, 132, 133,
palumbaria, Eubolia ...	206	134, 135, 166, 167, 168, 175, 218,	
palustrana, Mixodia ...	205	219, 299	
palustris, Hydrilla ...	190, 215, 293, 314	pinellus, Crambus ...	192
Pamphila ...	300	pinaria, Bupalus ...	93, 217
Pamphilidi ...	300	var. flavescens ...	217
pamphilus, Coenonympha ...	23, 90, 102,	piniperda, Panolis ...	13, 93, 95, 161,
105, 114, 224, 262, 301, 302		242, 243	
Paonias... ...	56, 57	pinivorana, Retinia ...	205
paphia, Dryas (Argynnis) ...	44, 50, 52,	pisi, Hadenia ...	215, 305
70, 99, 223, 283, 284		pistacina, Anchocelis ...	89, 158, 159,
var. valezina ...	26, 50, 131, 174, 284	160, 161, 206, 215, 304	
Papilio ...	82, 179, 240, 300	plagiata, Anaitis ...	93, 206
papilionaria, Geometra ...	14, 70, 89, 321	plantaginella, Lita ...	116
Papilionida ...	11, 213, 300	plantaginis, Nemeophila ...	23, 43, 44,
Papilionidae ...	213, 240, 300	93, 119, 131, 165, 185	
Papilionides ...	11, 71, 277, 300	var. hospita... ...	43, 70, 185
Papilionidi ...	300	Platypterygides ...	71
Papilioninae ...	300	Plebeius ...	220, 300
parallelaria (vespertina), Epione ...	51, 52, 206	plecta, Noctua ...	93, 94, 304
Pararge ...	301	plumigera, Ptilophora ...	192, 208, 288
Parargidi ...	301	Plusia ...	27, 145
parthenias, Brepheos ...	161	podalirius, Papilio ...	223
		Polia ...	59, 214
		polychloros, Eugonia (Vanessa) ...	223, 302

	PAGE		PAGE
polydama, Papilio	103, 104, 105, 107	purpuralis, Pyrausta	14, 51
polygonalis, Mecyna	... 236, 318	purpuraria, Lythria	... 317
Polygonia	... 301	pusaria, Cabera	... 43, 93
polygrammata, Phibalapteryx	... 313	pustulata (bajularia), Phorodesma	... 321
polymeda, Hipparchia	... 104, 107	puta, Agrotis	... 66, 69, 185, 304, 323
Polymita	... 295	putrescens, Leucania	... 186
Polymixis	... 295	putris, Axylia	... 93, 206, 303
Polyommatus	... 219, 220, 300	pygmaeata, Eupithecia	... 162
pomonella, Carpocapsa	... 95	pyraliata, Cidaria	... 14, 158
popularis, Neuronina	66, 89, 185, 303	Pyralidae	... 96
populella, Gelechia	... 88	Pyralides	... 145, 205, 270
populeti, Taeniocampa	14, 23, 242, 243, 279, 292	pyralina, Calymnia	151, 161, 215
populi, Poecilocampa	155, 162, 184	Pyralis	... 270
	205, 318	Pyrameis	... 301
populi, Smerinthus	56, 57, 230, 247, 302	pyramidea, Amphipyra	66, 158, 159, 320
porata, Zonosoma (Ephyra)	... 95	pyri, Saturnia	... 42, 70
porcellus, Choerocampa	17, 69, 93, 94, 160	pyrina, Zeugera	... 306
potatoria, Odonestis	... 120, 247	pyrophila, Agrotis, <i>vide</i> simulans, A.	
praecox, Agrotis	16, 94, 161, 162		
praelongana, Penthina	<i>vide</i> soror- culana, P.	quadratum, Noctua	... 137
prasina (herbida), Alecta	89, 215, 316	quadripunctata (cubicularis), Cara- drina	... 94, 120, 215, 260, 304
prasinana, Hylophila	... 65, 214, 303	quercifolia, Lasiocampa	4, 67, 229, 247, 248
precursaria, Oporabia	... 291, 292	quercinaria (angularia), Eugonia	119, 176, 189, 206, 319
proboscidalis, Hypena	... 254, 305	quercus, Bombyx (Lasiocampa)	4, 71, 247
prodromana, Amphisa	... 205	var. callunae	... 67, 71
prodromaria, Amphidasys	<i>vide</i> strata- ria, A.	quercus, Zephyrus (Thecla)	186, 213, 220, 300
promethea, Callosamia	... 42	radcliffei, Hyboma	... 296
pronoe, Erebia	... 224	radians, Gnostura	... 150
var. pitho	...	ramburalis, Diasemia	... 318
pronuba, Tryphaena	12, 63, 88, 94, 113, 151, 153, 304	rapae, Pieris	11, 223, 301, 302
propugnata, Coremia	<i>vide</i> designata, C.	raschkiella, Laverna	... 156
protea, Hadena	61, 88, 94, 156, 159, 214	rectangulata, Eupithecia	... 14, 151, 158, 160
pruinata, Pseudoterpna	... 68, 260	rectilinea, Hadena	... 89, 92, 94
prunata, Cidaria	... 14	remutaria, Acidalia	... 158
pruni, Thecla	... 213, 220	repandata, Boarmia	70, 151, 192, 217, 245
Pseudo-Bombyces	... 287, 303	var. conversaria	... 151, 217
pseudopretella, Oecophora	... 88	resinella (resinana), Retinia	15, 192, 205, 235, 236, 280, 282, 285
psi, Acronycta	57, 58, 59, 67, 127, 146, 148, 256, 257, 294, 295, 303	reticella, Epichnopteryx	23, 44, 69, 89, 113, 163
Psyche	... 121	reticulata, Cidaria	... 145, 236
Psychidae	... 115	reticulata (saponariae), Neuria	46, 160, 215, 313
Pterophorides	... 287	retusa, Tethea (Plastenis)	90, 183, 215
Pterophorus	... 177, 270	rhannata, Scotosia	... 66
Pterostoma	... 288	rhanni, Gonepteryx	3, 4, 52, 55, 99, 223, 301
Ptilodontidae	... 163	Rhodoceri	... 301
Ptilophora	... 288	Rhodocera	... 11
pudibunda, Dasychira	46, 224, 278, 303	Rhopalocera	... 176, 240
pudica, Arctia	... 150	ridens, Asphalia	26, 65, 95, 217, 295
puer, Cupido	... 220	ripae, Agrotis	... 16, 89, 185
pulchella, Deiopeia	189, 214, 313	rivata, Melanippe	... 320
pulchellata, Eupithecia	... 46	roboraria, Boarmia	69, 70, 119, 245, 278, 280, 281, 315
pulchrina, Plusia	14, 152, 160, 185	roboris, Thecla	... 186, 187
pulveraria, Numeria	... 152	rostralis, Hypena	... 4, 242, 305
pulverulenta (cruda), Taeniocampa	66, 159, 192, 206, 242, 279, 304, 316		
pumilata, Eupithecia	... 162, 316		
punctalis, Stenia	... 184		
punctaria, Zonosoma (Ephyra)	... 145		
punctidactyla, Pterophorus	<i>vide</i> cosmo- dactyla, Amblyptilia		



	PAGE		PAGE
rubi, Bombyx	13, 14, 42, 63, 64, 152, 153, 229, 263	senex, Nudaria	... 214
rubi, Callophrys (Thecla)	11, 162, 213, 220, 223, 300	serena, Hecatera	95, 206, 215, 305
rubi, Noctua	... 66, 94, 304	Sesia	... 247, 248
rubidata, Anticlea	... 192, 206	Sesiidae	... 277
rubiginata (rubricata), Acidalia	44, 67, 90, 95, 293	sexalisata (sexalata), Lobophora	... 162
rubiginea, Dasyampa	4, 123, 145, 156, 157, 162, 242, 243, 279, 293	sibylla, Limenitis	4, 26, 44, 279, 301, 309
rubiginosana, Poedisca	... 205	silaceata, Cidaria	... 109, 209
rubricosa, Pachnobia	13, 23, 93, 159, 192, 215, 242, 243	simulans (pyrophila), Agrotis	89, 112, 145, 161, 192
rufa, Caenobia	... 66, 91	sinapis, Leucophasia	51, 52, 81, 99
rufata, Chesias	... 94	var. diniensis	... 81, 201
rufescens, Ceratophora	... 113	var. lathyri	... 81, 201
rumicis, Acronycta	58, 59, 146, 147, 148, 206, 294, 296, 297, 303	ab. ♀ erysimi	... 81, 223
Rumiinae	... 287	sinuana, Sciaphila	... 156
rupicaprarina, Hybernina	... 206, 241	sinuata, Anticlea vide cucullata, A.	
Ruralis	... 220	Sioninae	... 287
rurea, Xylophasia	... 94, 221	siterata (psitticata), Cidaria	120, 159
var. combusta	... 94, 221	smaragdaria, Phorodesma	44, 46, 82, 84, 113, 145, 163
var. nigro-rubida	... 221	Smerinthinae	... 57
var. ochrea	... 221	Smerinthus	56, 57, 177, 227, 228, 229, 230, 247, 248
russula, Nemeophila (Euthemonis)	93, 144	sobrina, Noctua	92, 161, 176, 215
Rusticus	... 220	socia (petrificata), Xylina	4, 214, 242, 316
sacrarina, Sterrha	... 157, 317	sociata, Melanippe	... 43, 250, 319
sagittata, Cidaria	... 91, 145, 176	var. cingulata	... 249, 319
salicata, Larentia	... 89	var. degenerata	... 249
salicella, Antithesia (Dasytoma)	... 243	sociella, Aphonina	... 237
salicis, Leucoma	... 246	solaris, Acontia	... 317
salinellus, Crambus	... 162, 216	Solenobia	... 69
sanguinalis, Rhodaria	... 98	solidaginis, Calocampa (Lithomia)	89, 92, 94, 112, 161, 186, 214
sao, Syricthus	... 224	sordidata (elutata), Hypsipetes	13, 17, 70, 71, 142, 165, 231
satellitina, Scopelosoma	4, 88, 89, 215, 279, 316	var. infusata	... 143
Saturnia	... 42, 247, 287	sororculana, Penthina	... 205
Saturniides	... 287	spadicearia, Coremia vide ferrugata, C.	
Satyridae	... 213, 301, 310	sparganii, Nonagria	... 314
Satyrinae	... 11, 100, 114, 301	spartiata, Chesias	... 94, 159
satyrion, Coenonympha	... 50	sperata, Acronycta	... 57, 296
saucia, Agrotis	120, 159, 160, 162, 192, 206, 285, 304	sphegiformis, Sesia	130, 160, 189, 208, 321
scabiosae, Zygaena	... 50	Sphingidae	... 235, 247, 248
scabruscula (pinastri), Dipterygia	... 303	Sphingides	... 71, 190, 227, 246, 277, 287
scheultziana, Mixodia	... 17, 267	Sphinx	... 229, 247, 248, 310
scoliaeformis, Sesia	... 130, 176, 189	sphinx (cassinea), Asteroscopus	157, 160, 184, 205, 233, 234
scolopacina, Xylophasia	... 71, 206, 303	Spilosoma	... 7, 214
segetum, Agrotis	91, 93, 94, 192, 304	spini, Thecla	... 223
Seladonia	... 295	sponsa, Catocala	... 66, 86
selasellus, Crambus	... 113	stabilis, Taeniocampa	13, 93, 123, 169, 192, 242, 279, 304, 316
selene, Brenthis (Argynnis)	43, 44, 51, 119, 130, 159, 189, 223, 284, 301	stae-johannis, Eudryas	... 198
selini, Caradrina	... 260	stagnata, Hydrocampa	... 68
var. anceps	... 260	stantoniana, Penthina	... 205
semele, Hipparchia	47, 52, 114, 203, 222, 224, 301	statilinus, Hipparchia	... 11, 98
semiargus (acis), Nomiades (Lycaena)	51, 214, 220, 223, 300, 313	Stauropus	... 288
semibrunnea, Xylina	86, 156, 160, 161, 183, 214, 242, 243	stellatarum, Macroglossa	... 168, 303
semipurpurella, Micropteryx	... 322	stigmatica (rhomboidea), Noctua	66, 89, 152, 160, 161, 183
semirubella, Ilithyia	... 185	Stilbidi	... 287
		straminata, Acidalia	... 260

	PAGE
<i>var. circellata</i> ...	236, 313
<i>strataria</i> , <i>Amphidasys</i> ...	23, 26, 30, 316, 319
<i>stratitotata</i> , <i>Paraponyx</i> ...	66
<i>strigilis</i> , <i>Miana</i> ...	70, 94, 137, 303, 304
<i>var. aethiops</i> ...	70, 304
<i>strigillaria</i> , <i>Aspilates</i> ...	22
<i>strigosa</i> , <i>Acronycta</i> ( <i>Cuspidia</i> ) ...	58, 59, 91, 148, 294, 295, 296
<i>strigula</i> ( <i>porphyrea</i> ), <i>Lycophotia</i> ( <i>Agrotis</i> ) ...	14, 80, 267
<i>suadella</i> , <i>Lita</i> ...	116
<i>suavella</i> , <i>Rhodophaea</i> ( <i>Phycis</i> ) ...	216
<i>subciliata</i> , <i>Eupithecia</i> ...	185, 257, 258
<i>subfulvata</i> , <i>Eupithecia</i> ...	43, 83, 87, 109, 110, 160, 197, 198, 254, 255
<i>var. oxydata</i> ...	83
<i>subgothica</i> , <i>Agrotis</i> ...	192
<i>sublustris</i> , <i>Xylophasia</i> ...	14, 160, 206
<i>subochrea</i> , <i>Hyboma</i> ...	296
<i>subrosea</i> , <i>Noctua</i> ...	190, 192, 314
<i>subrufa</i> , <i>Noctua</i> ...	138
<i>subsequa</i> , <i>Tryphaena</i> ...	15, 66, 70, 92, 95, 175, 293
<i>subtusa</i> , <i>Tethea</i> ( <i>Plastenis</i> ) ...	14, 89, 160, 183, 215
<i>succenturiata</i> , <i>Eupithecia</i> ...	43, 83, 87, 109, 110, 197, 198, 254, 255
<i>suffumata</i> , <i>Cidaria</i> ...	23, 44, 93
<i>var. piceata</i> ...	23, 44
<i>suffusa</i> , <i>Agrotis</i> <i>vide</i> <i>ypsilon</i> , <i>A.</i> ...	146, 296
<i>superans</i> , <i>Acronycta</i> ...	14
<i>suspecta</i> , <i>Dyschorista</i> ( <i>Orthosia</i> ) ...	71, 80, 81, 88, 89, 92, 94, 120, 160, 161, 183, 215, 304
<i>var. congener</i> ...	80
<i>var. grisea</i> ...	81
<i>var. iners</i> ...	80
<i>var. laevis</i> ...	80
<i>var. nigrescens</i> ...	80, 81
<i>sub-var. nigrescens-variegata</i> ...	80, 81
<i>var. pallida</i> ...	80
<i>var. rufa</i> ...	80, 81
<i>var. variegata</i> ...	80, 81
<i>Swammerdamia</i> ...	309
<i>Swammerdammella</i> ...	309
<i>sylvanus</i> , <i>Pamphila</i> ...	22, 50, 224, 300, 302
<i>sylvata</i> ( <i>ulmata</i> ), <i>Abraxas</i> ...	43
<i>sylvinus</i> , <i>Hepialus</i> ...	14, 93, 305
<i>Syrichthus</i> ...	50, 300
<i>syringaria</i> , <i>Pericallia</i> ...	70, 149, 152, 206
<i>tabaniformis</i> , <i>Sciapteron</i> ...	313
<i>taenialis</i> , <i>Hypenodes</i> <i>vide</i> <i>albistrigalis</i> , <i>H.</i> ...	166, 176
<i>taeniata</i> , <i>Emmelesia</i> ...	23, 44
<i>Taeniocampa</i> ...	279
<i>Taeniocampae</i> ...	224, 300
<i>tages</i> , <i>Nisoniades</i> ...	224, 300
<i>taminata</i> , <i>Corycia</i> <i>vide</i> <i>bimaculata</i> , <i>B.</i> ...	89, 158, 160, 215, 304
<i>taraxaci</i> , <i>Caradrina</i> ...	305
<i>tarsipennalis</i> , <i>Zanclognatha</i> ...	247
<i>tau</i> , <i>Aglia</i> ...	55, 149
<i>templi</i> , <i>Dasypolia</i> ...	94
<i>tenebrosa</i> , <i>Rusina</i> ...	94

	PAGE
<i>tenuiata</i> , <i>Eupithecia</i> ...	47
<i>terminella</i> , <i>Asychna</i> ...	156
<i>testacea</i> , <i>Luperina</i> ...	152, 260, 303
<i>testata</i> , <i>Cidaria</i> ...	66, 152
<i>tetractyla</i> , <i>Acipitilia</i> ...	52
<i>tetralunaria</i> , <i>Selenia</i> ...	69, 319
<i>Thais</i> ...	81, 82
<i>thalassina</i> , <i>Hadena</i> ...	93, 94, 215, 305
<i>Thamnonoma</i> ...	199
<i>thauamas</i> , <i>Thymelicus</i> ( <i>Pamphila</i> ) ...	64, 224, 300
<i>Thecla</i> ...	114, 187, 213, 219, 220, 300
<i>Theclidi</i> ...	219, 220, 300
<i>thore</i> , <i>Argynnis</i> ...	222, 223
<i>thrasonella</i> , <i>Glyphipteryx</i> ...	156
<i>Thyatiridae</i> ...	163
<i>Thymelicus</i> ...	300
<i>tiliae</i> , <i>Smerinthus</i> ...	56, 57, 70, 302
<i>tiliaria</i> ( <i>absicaria</i> ), <i>Ennomos</i> ( <i>Eugonia</i> ) ...	66
<i>tineta</i> , <i>Aplecta</i> ...	89, 215, 245
<i>Tinea</i> ...	96
<i>Tineidae</i> ...	96
<i>Tineides</i> ...	71, 91, 95, 287
<i>Tineina</i> ...	96, 115, 177, 270
<i>tipuliformis</i> , <i>Sesia</i> ...	306
<i>tithonus</i> , <i>Epinephele</i> ...	114, 224, 301, 302, 309
<i>tityus</i> <i>vide</i> <i>bombyliformis</i> , <i>Macroglossa</i> ...	276
<i>Tortricides</i> ...	91, 145, 176
<i>trabealis</i> ( <i>sulphuralis</i> ), <i>Agrophila</i> ...	44, 90, 95, 293
<i>tragopogonis</i> , <i>Amphipyra</i> ...	67, 88, 158, 159, 304
<i>transalpina</i> , <i>Zygaena</i> ...	20, 21, 50
<i>trapezina</i> , <i>Calymnia</i> ...	66, 92, 94, 151, 159, 215, 304, 321
<i>trepida</i> , <i>Notodonta</i> ...	288
<i>Triana</i> ...	57, 58, 146, 294, 295
<i>triangulum</i> , <i>Noctua</i> ...	89, 304
<i>Tricholoeche</i> ...	296
<i>tridens</i> , <i>Acronycta</i> ...	148, 256, 257, 294, 295, 303
<i>trifolii</i> ( <i>chenopodii</i> ), <i>Hadena</i> ...	23, 67, 191, 215, 305
<i>trifolii</i> , <i>Zygaena</i> ...	20, 255
<i>trigeminata</i> , <i>Acidalia</i> ...	158
<i>trigrammica</i> ( <i>trilinea</i> ), <i>Grammesia</i> ...	16, 206, 215, 304
<i>var. bilinea</i> ...	89, 151, 158
<i>trimacula</i> , <i>Notodonta</i> ( <i>Drymonia</i> ) ...	144, 238
<i>trimeni</i> , <i>Sapaea</i> ...	192
<i>tripartita</i> ( <i>urticae</i> ), <i>Habrostola</i> ...	152, 160, 305
<i>triplasia</i> , <i>Habrostola</i> ...	152, 160, 305
<i>Triptogon</i> ...	57
<i>trisignaria</i> , <i>Eupithecia</i> ...	88
<i>tristana</i> , <i>Peronea</i> ...	16
<i>tritici</i> , <i>Agrotis</i> ...	47, 66, 67, 94, 100, 161, 162, 165, 191, 255, 260
<i>var. aquilina</i> ...	160, 161
<i>synonym</i> , <i>cornua</i> ...	255
<i>tritona</i> , <i>Hyboma</i> ...	296
<i>tritophus</i> , <i>Notodonta</i> ...	288
<i>truncata</i> , <i>Cidaria</i> ...	14

	PAGE
<i>Tryphaena</i> ... ..	215
<i>tyndarus</i> , <i>Erebia</i> ... ..	222, 223
<i>typica</i> , <i>Naenia</i> ... 46, 120, 191, 304, 321	
<i>typhon</i> ( <i>davus</i> ), <i>Coenonympha</i> 100,	
103, 104, 105, 107, 114, 120, 177,	
265, 266, 267, 301	
<i>var. laidion</i> ... ..	106, 107
<i>var. philoxenus</i> ... ..	105, 107
<i>var. rothliebii</i> 103, 104, 105, 107	
<i>ulmella</i> , <i>Scoparia</i> ... ..	216
<i>umbra</i> ( <i>marginata</i> ), <i>Chariclea</i> [ <i>Pyrrha</i>	
( <i>Heliothis</i> )] ... 92, 94, 185, 203, 215	
<i>umbratica</i> , <i>Cucullia</i> 94, 152, 160, 185,	
206, 305	
<i>umbrosa</i> , <i>Noctua</i> ... ..	66, 89, 94
<i>unanimis</i> , <i>Apamea</i> ... ..	65, 90, 160
<i>uncula</i> , <i>Hydrelia</i> ... ..	159
<i>undulatus</i> ( <i>revayana</i> ), <i>Sarothrips</i> 214	
<i>undulata</i> , <i>Eucosmia</i> ... ..	22
<i>unidentaria</i> , <i>Coremia</i> 14, 66, 109, 250	
<i>unita</i> , <i>Lithosia</i> ... ..	98
<i>unionalis</i> , <i>Margarodes</i> ... ..	236, 318
<i>upsilon</i> , <i>Orthosia</i> ... ..	215, 304
<i>Urapterygidae</i> ... ..	287
<i>urticae</i> , <i>Spilosoma</i> 44, 47, 90, 240	
<i>urticae</i> , <i>Vanessa</i> 3, 4, 55, 63, 71, 131,	
170, 223, 229, 278, 285, 301, 302, 320	
<i>vaccinii</i> , <i>Orrhodia</i> 4, 89, 94, 159,	
162, 242, 269, 304, 316	
<i>Vanessa</i> ... ..	8, 150, 301
<i>Vanessidi</i> ... ..	11, 301
<i>variata</i> , <i>Thera</i> ... ..	89, 159, 206
<i>vellata</i> , <i>Hepialus</i> ... ..	93
<i>venosata</i> , <i>Eupithecia</i> ... ..	
<i>var. nubilata</i> ... ..	249
<i>verbasci</i> , <i>Cucullia</i> ... ..	22
<i>vernaria</i> , <i>Geometra</i> ... ..	160
<i>versicolor</i> , <i>Endromis</i> 15, 46, 227,	
230, 246, 247, 248	
<i>vestigialis</i> ( <i>valligera</i> ), <i>Agrotis</i> 47, 67,	
94, 113, 161, 165, 255, 256	
<i>vetusta</i> , <i>Calocampa</i> 46, 68, 92, 94,	
159, 160, 214	
<i>viburniana</i> , <i>Tortrix</i> ... ..	16, 266
<i>viduaria</i> , <i>Oleora</i> ... ..	236, 313
<i>villica</i> , <i>Arctia</i> ... ..	13, 45, 114
<i>villosella</i> , <i>Psyche</i> ... ..	121
<i>viminalis</i> , <i>Cleoceris</i> ( <i>Epunda</i> ) 14, 92,	
214, 305	
<i>Viminia</i> 57, 58, 59, 146, 147, 148,	
294, 296, 297	
<i>vinculella</i> , <i>Tinea</i> ... ..	176, 178
<i>vinula</i> , <i>Dicranura</i> 177, 208, 288, 303	
<i>viretata</i> , <i>Lobophora</i> ... ..	118
<i>virgata</i> ( <i>lineolata</i> ), <i>Mesotype</i> ... ..	184
<i>virgaureae</i> , <i>Chrysophanus</i> 18, 223	
<i>virgaureata</i> , <i>Eupithecia</i> ... ..	249
<i>var. alternaria</i> ... ..	249
<i>virginensis</i> ( <i>huntera</i> ), <i>Pyrameis</i> ... ..	11
<i>viridana</i> , <i>Tortrix</i> ... ..	113, 205

	PAGE
<i>viridaria</i> ( <i>pectinitaria</i> ), <i>Larentia</i> 44, 93	
<i>viridata</i> , <i>Nemoria</i> ... ..	206
<i>vitellina</i> , <i>Leucania</i> 68, 184, 190, 314	
<i>vittata</i> , <i>Phibalapteryx</i> ... ..	17, 66, 89
<i>vittella</i> , <i>Cerostoma</i> ... ..	113
<i>vulpina</i> , <i>Apatela</i> ( <i>Acronicta</i> ) ... ..	295
<i>w-album</i> , <i>Thecla</i> 22, 213, 219, 220	
<i>webbiana</i> , <i>Lycaena</i> ... ..	11
<i>wöckii</i> , <i>Solenobia</i> ... ..	69
<i>wollastoni</i> , <i>Pieris</i> ... ..	11
<i>Xanthia</i> ... ..	161, 293
<i>xanthographa</i> , <i>Noctua</i> 88, 89, 94,	
113, 152, 161, 304	
<i>xanthomista</i> ( <i>nigrocincta</i> ), <i>Polia</i> 168,	
206, 207, 214, 314	
<i>xerampelina</i> , <i>Cirrhoedia</i> 87, 89, 160,	
186, 215, 245	
<i>xiphioides</i> , <i>Satyrus</i> ... ..	11
<i>Xylina</i> ... ..	225
<i>xyliniformis</i> , <i>Pharetra</i> ... ..	296
<i>ypsilon</i> ( <i>suffusa</i> ), <i>Agrotis</i> 69, 94, 159,	
206, 304	
<i>zenobia</i> , <i>Papilio</i> ... ..	331
<i>Zephyrus</i> ... ..	213, 220, 290
<i>Zereminae</i> ... ..	237
<i>Zenzerides</i> ... ..	257
<i>zizaca</i> , <i>Notodonta</i> 65, 66, 288, 309	
<i>Zizera</i> ... ..	220
<i>zonaria</i> , <i>Nyssia</i> ... ..	25
<i>Zygaena</i> ... ..	12, 30
<i>Zygaenidae</i> ... ..	18, 277
<i>Zygaenides</i> ... ..	237

## ODONATA.

<i>Æschna cyanea</i> ... ..	240
<i>juncæ</i> ... ..	240
<i>Agrionidae</i> ... ..	145
<i>Enallagma cyathigerum</i> ... ..	240
<i>Ephemeridae</i> ... ..	145
<i>Hetoerina occisa</i> ... ..	239
<i>Leucorrhinia dubia</i> ... ..	69

## ORTHOPTERA.

<i>Cymatomera</i> ... ..	322
<i>Cyrtophyllus</i> ... ..	323
<i>Dyscritina longisetosa</i> ... 262, 282, 323	
<i>Panchlora maderæ</i> ... ..	166
<i>Periplaneta australasie</i> ... ..	192

## TRICHOPTERA.

<i>Halesis guttatipennis</i> ... ..	259
<i>Leptoceridae</i> ... ..	119

Vol. VII

No. 1

THE  
ENTOMOLOGIST'S RECORD  
AND  
JOURNAL OF VARIATION

EDITED BY  
J. H. REEVE

PRICE SIXPENCE  
SINGLE COPIES  
SEVEN SHILLINGS  
PER ANNUM IN ADVANCE  
HERBERT E. PAGE, RES.

PRINTED BY J. H. REEVE

NEW YORK  
PUBLISHED BY THE  
ENTOMOLOGICAL SOCIETY OF AMERICA  
WASHINGTON, D. C.



The Back Volumes (I.-VI.) of *The Entomologist's Record*, &c., can be obtained at 7s. 6d. per Volume. "Special Index" for Vol. III., IV., V., and VI., price 1/- each. Single Back Numbers of Vols. I.-VI. can be obtained at DOUBLE the published price, from H. E. PAGE, F.E.S., 14, Nettleton Road, New Cross, S.E.

**The succeeding Nos. of Vols. VII. of "The Entomologist's Record" will be issued on Oct. 15th; Nov. 1st & 15th; Dec. 1st & 15th; Jan. 15th; Feb. 1st & 15th; Mar. 1st & 15th; April 15th.**

**All Exchange Magazines must in future be forwarded to Dr. F. J. Buckell, 32, Canonbury Square, N.**

Reprints of Articles or Notes (long or short) appearing in this Magazine can be arranged for by Authors at a very low price, on application to Mr. H. E. PAGE, F.E.S., 14, Nettleton Road, New Cross, S.E.

## NOTICE.

Subscribers are kindly requested to observe that subscriptions to *The Entomologist's Record*, &c., are payable in advance. The Subscription (including an extra shilling for the Special Index to Vol. VII., to save trouble) is SEVEN SHILLINGS, and must be sent to Mr. H. E. PAGE, 14, Nettleton Road, New Cross, S.E. Cheques and Postal Orders should be made payable to J. W. TURR.

ADVERTISEMENTS of Books and Insects for Sale will be inserted at a minimum charge of 2s. 6d. (for four lines). Longer Advertisements in proportion. A reduction made for a series. Particulars of Mr. H. E. PAGE, 14, Nettleton Road, New Cross, S.E.

Subscribers who change their addresses must report the same to Mr. H. E. PAGE, 14, Nettleton Road, New Cross, S.E., otherwise their magazines will probably be delayed.

## EXCHANGE.

[EXCHANGES, which should consist only of the specific names of Duplicates and Desiderata, are inserted for SUBSCRIBERS without charge so long as there is available space, but they MUST NOT be written on Post or Letter Cards, the inconvenience arising from which is very great. No exact limit is placed on the length of lists of Duplicates, but lists of Desiderata should be as short as possible. Entomological Books wanted may also be inserted in this column.]

[The Editor wishes to state that the publication of Exchanges, Advertisements, &c., in this Magazine, is in no way to be taken as a guarantee of the authenticity, good condition, &c., of the specimens. This Notice is not intended to throw doubt upon the *bona fides* of Advertisers, &c., but to free the Editor from responsibility, should the privilege be abused.] *Marked \* are bred.* N.B.—Exchange Lists addressed to J. W. TURR, Westcombe Hill, S.E., must be received before the 6th, for publication on the 15th, and before the 20th for publication on the 1st.

**EXCHANGE BASKETS.**—The Baskets have been re-arranged:—Forwarded:—Sept. 2nd, No. 1.—Messrs. Page, Buchan, Maddison, Finlay, Thornehill, Robertson, Bush, Gunning, Moberly, Beadle. Sept. 2nd, No. 2.—Major Robertson, Messrs. Maddison, Wylie, Bowles, Newgate, Duncan, Turner, Walker, Webb, Christy. Sept. 2nd, No. 3.—Messrs. Mason, Corbett, Maddison, Finlay, Freer, Whittle, Horne, Mera, Christy, King. Sept. 2nd, No. 4.—Messrs. Riding, Williamson, Cannon, Fenn, Finlay, Burrows, Atmore, Gunning, Richardson, Maddison. [It is useless for members to write to me about delays. When a basket is delayed the member who should have it, should write to his predecessor, and so on until the offender is brought up to scratch. Members who wish to be left out for a round owing to absence from home, &c., must write to their predecessors in above lists.—J.W.T.] Members should also acquaint themselves with changes of address for last month and this.

*Duplicates.*—Machaon (2), Cassiope, Suspecta, Tincta, Vittata, Papilionaria (2), Aurantia, Olivata (fair), Sordidata (dark brown vars.), C. ericellus, M. schulziana. *Desiderata.*—Iris, W. album, Pruni, Porcellus, Bombyliiformis, Apiformis, Clearwings, Bicolorana, Strigula, Senex, Muscerda, Sorocula, Griseola, Deplana, Complana, Sericea, Caniola, Rubricollis, A. urticae, Ligniperda, Pyrina, Asella, Cratægi, Castrensis, Binaria, Cultraria, Furcula, Bifida, Cuculla, Chaonia, Trimacula.—H. A. Beadle, 14, Station Street, Kenwick.

*Duplicates.*—Fine Rhamni, Icarus, V. urticae, \* Ligustri, \* Populi, \* Monacha, \* Plantaginis, \* Quercinaria, \* Plumaria, Citraria, Adustata, \* Rectangulata\* (dark), Vetulata, \* Rhamnata, \* Flammea, C-nigrum, Upsilon\*, Argentula, Festuca\*, etc. *Desiderata.*—Larvæ or pupæ only. A. urticae, Populi, Advenaria, Dolobraria, Lunaria, Fuscantaria, Pennaria, Hispidaria, Betularia (black), Rufina, Croceago, Carpophaga, and offers.—J. W. Moore, 194, Stratford-road, Birmingham.

*Duplicates.*—Brassicæ, \* Atalanta, Io, \* Filipendulæ, \* Jacobææ, \* Dispar, \* Monacha, \* Bucephala, \* Instabilis, \* Stablis, \* Silago, \* Chi, \* Aprilina. *Desiderata.*—Orion and common Butterflies to renew.—F. J. Russell, 67, St. James' End, Northampton.

*Duplicates.*—Plumaria, Hippocastanaria, Citraria, Gilvaria, Multistrigaria, Dubitata, Progenmmaria, Æscularia, Leucophæaria, Parthenias, Reclusa, Phragmitidis, Filavago, Mendica, Piniaria, Aversata, Ornata, Obscurata, Crepuscularia, Biundularia, Pilosaria, Rivata, Subtristata, Ocellata, Juniperata, Comitata, Fulvata, Testata, Punctaria, Trilinearia, Mendica, Hispidaria, Reclusa, Unca, Sulphuralis, Corydon, Adonis, Paphia, Valezina, Loniceræ, all in fine condition, well set on black pins. *Desiderata.*—Numerous; must be well set; black pins preferred.—T. W. Jackson, St. John's Lane, London, E.C.

*Duplicates*.—*Menthastri*\* vars. *carbonica*, *ochracea* and *intermediates*, *Lubricipeda*\* var. *radiata* and *intermediates*. No reply—not wanted.—*J. Harrison*, 71, *Gawber Road*, *Barnsley*.

*Duplicates*.—Pupæ of *Plumigera* and *Carmelita*; *Imagines* of *Smaragdaria*\* *Desiderata*.—*Albimacula*, *Orichalcea*, *Ravida*, *Templi*, and many others.—*W. E. Fremlin*, *Mereworth*, *Near Maidstone*, *Kent*.

*Duplicates*.—*Fuscantaria*\* and ova, *Erosaria*\* and ova, *Orbicularia*\*, *Dromedarius*\*, *Viminalis*\*, *Ocellatus*\*, *Falcula*\*, *Festiva*\* &c. *Desiderata*.—*Duplaris*, *Ocularis*, *Or*, *Orion*, *Alni*, *Conspersa*, *Promissa*, *Acidalie*, *Eupithecie*, and numerous common species.—*S. Walker*, 23, *Portland Street*, *York*.

*Duplicates*.—*C-album*\*, *Adonis*, *Tipuliforme*, *Bifida*\*, *Cucullina*\*, *Carmelita*\*, *Dietæa*\*, *Anachoreta*\* (British), *Curtula*\*, *Dromedarius*\*, *Alni*\*, *Australis*, *Valligera*, *Xerampelina*, *Affinis*\*, *Vetusta*, *Lunaria*\*, *Zonaria*\*, *Notata*, *Taminata*, *Dodoneata*, *Hexapterata*, &c., &c. *Desiderata*.—*Arion*, *Apiformis*, *S. urticae*, *Chaonia*, *Agathina*, *Cæsia*, *Retusa*, *Occulta*, *Hispidaria* (male), *Rubricata*, *Straminata*, *Griseata*, and many others.—*C. Fenn*, *Eversden House*, *Burnt Ash Hill*, *Lee*, *Kent*.

*Duplicates*.—Continental Butterflies and Moths. *Desiderata*.—Almost any British species.—*Ludwig Endress*, *Nuremberg*, *Maxfeldstrasse 84*; *Germany*.

*Duplicates*.—*E. tenuitata*\* (black pins). *Desiderata*.—*Consignata*, *Succenturiata*, *Subumbra*, *Pernotata*, *Plumbeolata*, *Pygmæata*, *Egenata*, *Jasioneata*, *Trisignaria*, *Virgaureata*, *Valerianata*, *Irriguata*, *Innotata*, *Constrictata*, *Expallidata*, *Subciliata*, *Dodoneata*, *Coronata*, types or in numbers.—*J. P. Mutch*, 359, *Hornsey Rd.*, *London*, *N.*

*Duplicates*.—*Edusa*, *A. crataegi*, *Lineola*, *Pygmaeola*, (type form), *Dominula*, *Plantaginis*, *Lucerneæ*, *Glaresosa*, *Strataria*, *Silaceata*, *Carnella*, *Tages*, *Malvæ*, *Bellargus*, *Loniceræ*, *Taminata*, *Ornata*, *Rubiginata*, *Remutata*, *Candidata*, *Mi*, *Glyphica*, *Ænea*, &c. *Desiderata*.—*Carpophaga*, *Conspersa*, *Obscuraria*, *Biundularia* (dark), *Crepuscularia* (dark), *Cerago* vars., *Obfuscata*, *Auroraria*, *Notata*, *Belgaria*, *Hexapterata*, *Progenmaria* (dark), &c.—*J. W. Tutt*, *Westcombe Hill*, *S.E.*

*Duplicates*.—A few *Testudo*. *Desiderata*.—*Semibrunnea*, *Absinthii*, *Lychnitis*, *Chryson*, *Occulta*, *Chaonia*, *Cæsia*, and other local species.—*J. W. Tutt*, *Westcombe Hill*, *S.E.*

*Duplicates*.—North American Lepidoptera.—*Papilio*, *Argynnis*, *Colias*, *Polyphemus*, *Cecropia*, &c. *Desiderata*.—Exotics of all kinds, and European Noctue. Send list of duplicates or for list of desiderata.—*Chas. S. Westcott*, *Holmesbury*, *Philadelphia*, *Penn. U.S.A.*

*Duplicates*.—*Luna*, *Angulifera*, *Imperialis*, *Regalis*, &c., set specimens; the rarer pupæ, as *Angulifera*, *Luna*, &c.; many papered lepidoptera in Noctuidæ, Bombycidæ, Geometridæ, &c. Exchanged for Cocoons of *Actias*, *Isabella*, and other rare foreign moths.—*Emily L. Morton*, *Newburg*, *New York* (*New Windsor Delivery*).

*Duplicates*.—*Potatoria*\*, *Aprilina*\*, *Io*\*, *Wavaria*\*, *T. quercus*\*, *Umbratica*, &c. Pupæ of *Laesetris* and *Aprilina*. *Desiderata*.—*C. album*, *Epiphron*, *Corydon*, *Argiolus*, *Alsus*, *Sibylla*, *Comma*, *Miniosa*, *Quadra*, *Chamomillæ*, and many others to extend.—*Wm. Foddy*, *Wolberton Road*, *Stony Stratford*, *Bucks.*

*Duplicates*.—*Obscurata*, *Citraria*, and many others. *Desiderata*.—Very numerous.—*H. E. Page*, 14, *Nettleton Road*, *New Cross*, *S.E.*

*Duplicates*.—A few *D. cæsia*. *Desiderata*.—*Iris*, *Arion*, *Antiope*, *Galii*, *Scolisiformis*, *Sphegiformis*, *M. arundinis* ♀, *Centonalis*, *Caniola*, *Cænosa*, *Ilicifolia*, *Viduaris*, *Smaragdaria*, *Contiguaris*, *Immorata*, *Strigosa*, *Alni*, *Auricoma*, *Albipuncta*, *Putrescens*, *Maritima*, *Cannæ*, *Brevilinea*, *Conspicillaris*, *Exigua*, *Leucophæa*, *Dumerili*, *Guenei*, *Ophiogramma*, *Palustris*, *Fennica*, *Cinerea*, *Pyrophila*, *Ashworthii*, *Subrosea*, *Sobrina*, *Carnica*, *Rubiginea*\*, *Retusa*, *Oo*, *Pyralina*, *Echii*, *Empyrea*, *Conformis*, *Zinckenii*, *Peltigera*, *Scutosa*, *Bractea*, *Cracæ*. Fine and well set on black pins.—Only accepted offers replied to.—*H. Shortridge Clarke*, *Silby Parsonage*, *Lezayre*, *I. of Man*.

*Duplicates*.—Ova; *Antiqua*; Larvæ: *Saponariae*, *Typica*, *Cytherea*; Pupæ: *Aprilina*; *Imagines*: *Pyramidea*, *Pastinum*, *Cytherea*, *Popularis*, *Procellata*, *Albicillata*, *Tersata*, *Perla*.—*C. W. Williams*, 24, *Hickman Road*, *Penarth*.

*Duplicates*.—*Solidaginis*, *Suspecta*, *Litura*, *Literosa* (few), *Furva* (few), *Artaxerxes* (few). All fine specimens, and well set on black pins. *Desiderata*.—Common Southern species.—*John Black*, 1, *West Craibstone Street*, *Aberdeen*, *N.B.*

*Duplicates*.—*Lineola* and *Castrensis*; Larvæ of *Villica* and *Smaragdaria*; Pupæ of *Suaza*. *Desiderata*.—*Cespitis*, *Straminea*, *Ambigua*, *Abjecta*, *Saponariae*, *Leporina*, *Fluctuosa*, *Dodonea*, *Deplana*, *Formiciformis*, *Bombyliiformis*; types of many *Micros*.—*F. C. Whittle*, 3, *Marine Avenue*, *Southend*.

*Duplicates*.—*Corydon*, *Cucullatella*\*, *Hepatica*, *Bicoloria*, *Literosa*, *Taraxaci*, *Putæ*, *Suffusa*, *Saucia*, *Nigricans*, *Augur*, *C-nigrum*, *X. flavago*\*, *Circellaris*\*, *Populeti*, *Strataria*\*, *Hirtaria*, *Quercinaria*\*, *Obscuraria*, *Ochrearia*, *Absinthiata*\*, *Assimilata*\*, *Isogrammaria*\*, *Bicolorata*, *Hastata*, *Unagulata*, *Sociata*\*, *Rhamnata*\*, *Vetulata*\*, *Bipunctaria*, *Upsilon*\*, *Plumbellus*, *Pastinacella*\*, *Perla*, *Phragmitidis*, *Dubitata*\*, *Unidentaria*\*, *Ocellata*\* *Desiderata*.—Very numerous.—*Louis B. Prout*, 12, *Greenwood Road*, *Dalston*, *N.E.*

*Duplicates*.—*Sibylla*\*, *Polychloros*\*, *Atalanta*\*, *Io*\*, *Betula* (fine), *Galatea*, *Corydon*, *Aglaia*, *Lineola*, *Selene*, *Euphrosyne*, *Rhamni*, *Venosa*\*, *Auriflua*\* *Desiderata*.—*Aegon*,

Artemis, Cinxia, Athalia, Cardui. None but fine and well-set insects on black pins sent or wanted.—*H. Mousley, Wisbech.*

*Duplicates.*—*Scoliiforme*,\* *Craccae*,\* *Pyrophila* (Scotch), *Humuli* var. *Hethlandica*, *Exulans*, *Piceana*.\* *Desiderata*.—*Leucophaea*, *Moneta*, *Strigilata*, *Abjecta*, *Bondii*, *Concolor*, *Ambigua*, *Cannae*, *Uvae*, *Reticulata*, *Caesia*, *Nigrocincta*, and other rarities or varieties.—*P. M. Bright, Roccastruna, Bournemouth.*

*Duplicates.*—*Betulae*, *Davus*, *Sibylla*, *Blandina*, *Fuciformis*, *Bombyliformis*, *Confusa* (Shetl. and vars.), *Dahlia*, *Tritici* (Scotch), *Cursoria*, *Litura*, *Albulata* var. *Thule*, *Myrica*, *Fumata*, *Salicata*, *Alni*, *Carbonaria*, *Adusta*, *Alternata*, *Cinctaria*, *Meliloti*, *Miniosa*, *Fuscula*, *Sponsa*, *Suspecta*, *Glaresca*, *Adipellus*, *Achatana*, *Alpinalis*, *T. ochracea*. *Desiderata.*—Very numerous, to extend series.—*P. M. Bright, Roccastruna, Bournemouth.*

CHANGES OF ADDRESS.—(Hon.) *N. Chas. Rothschild* to *Tring Park, Tring, Herts.*—*Colonel Partridge*, from *Enniskillen*, to *Farchynys, Dolgelly, N. Wales*, till 30th September.

WANTED.—Copy of *Larvæ of the British Lepidoptera and their Food-Plants*, by *Owen S. Wilson*, in good condition. Lowest cash price to—*Mrs. D. Twopeny, Woodstock, Sittingbourne, Kent.*

NOTICE.—All communications received and accepted will be printed as soon as space permits.—*Ed.*

## MEETINGS OF SOCIETIES.

**The City of London Entomological and Natural History Society.** London Institution, Finsbury Circus, E.C.—The first and third Tuesdays in the month, at 7.30 p.m. Papers and Notes at every Meeting. Non-members cordially invited.

**The South London Entomological and Natural History Society,** Hibernia Chambers, London Bridge.—The second and fourth Thursdays in each month, at 8 p.m. Papers are promised by Messrs. Billups, Robson, Step, Mansbridge, South, Hewett, etc.

**Entomological Society of London**, 11, Chandos Street, Cavendish Square, W.—Wednesday, at 8 p.m. October 2nd. 16th; November 6th; December 4th; January 15th, 1896. Annual Meeting.

NOTICE.—If any of our provincial subscribers have interesting series of variable species of lepidoptera they would like exhibited at the meetings of one or other of the London Societies, and will pack such most carefully and forward with a stamped return label, we should be pleased to hear from them.—*Ed. [Rayleigh Villa, Westcombe Hill, Blackheath, S.E.]*

FOR SALE.

BARRETT'S "BRITISH LEPIDOPTERA,"

VOLS. 1 and 2, BOUND.

COST £5 16s. 0d. PRICE £4.

APPLY—H. MOUSLEY, WISBECH.

PROSPECTUS for 1895.] [The Leading Journal of its kind.

4 dols. per Year. 4 dols. 60 cts. per Year (Foreign). 35 cts. per Copy.

THE AMERICAN NATURALIST

A MONTHLY JOURNAL DEVOTED TO THE NATURAL SCIENCES IN THEIR  
WIDEST SENSE.

Managing Editors—Prof. E. D. Cope, Philadelphia, Pa., and J. S. Kingsley, Boston, Mass.

Associate Editors—Prof. W. S. Bayley, of Colby University, Waterville, Me., Dept. of Petrography. Prof. W. H. Hobbs, Madison, Wisc., Dept. of Mineralogy. Dr. C. E. Bessey, of the University of Nebraska, Lincoln, Neb., Dept. of Botany. Prof. C. M. Weed, of College of New Hampshire, Durham, N. H., Dept. of Entomology. Prof. E. A. Andrews, of John Hopkins University, Baltimore, Md., Dept. of Embryology. H. C. Mercer, of the University of Pennsylvania, Dept. of Anthropology. Dr. C. O. Whitman, of Chicago University, Chicago, Ill., Dept. of Microscopic Technique.

PUBLISHED AT PHILADELPHIA, U.S.A.

THE EDWARDS & DOCKER Co., 518 & 520, MINOR STREET,  
PHILADELPHIA, U.S.A.

Advertising Rates will be furnished upon application.



**For Winter Reading and Winter Study.**

**THE**

## **Most Recent Works on Entomological Science.**

**Written especially for Students and Collectors.**

**Comprise the most recent information in Entomological Science; No Entomological Works have received more General and uniform praise from the public press.**

### **Woodside, Burnside, Hillside and Marsh,**

**By J. W. TUTT, F.E.S.**

**Bound in Cloth, Price 2/6.**

**242 pp. and 50 Illustrations.**

---

### **Random Recollections of Woodland, Fen & Hill,**

**By J. W. TUTT, F.E.S.**

**BOUND IN CLOTH, PRICE 3/-**

---

### **The British Noctuæ and their Varieties**

**By J. W. TUTT, F.E.S.**

**4 VOLS., PRICE SEVEN SHILLINGS PER VOLUME**

*(May be had separately).*

The only Systematic work on this interesting subject. Brings all the knowledge of this group up to date. Deals with every British species. Should be in the hands of every working Collector.

**From the Author, or Swan Sonnenschein & Co., Paternoster Square.**

---

### **Stray Notes on the Noctuæ,**

**By J. W. TUTT, F.E.S.**

**PRICE ONE SHILLING.**

Contains Essays on various subjects connected with this group, amongst others "Noctuæ in the British Museum," "Classification of the Noctuæ," etc.

---

### **Melanism and Melanochroism in Lepidoptera,**

**By J. W. TUTT, F.E.S.**

**BOUND IN CLOTH, PRICE 2/6.**

Deals exhaustively with all the views brought forward by scientists to account for the forms of Melanism and Melanochroism: contains full data respecting the distribution of melanic forms in Britian, and theories to account for their origin; the special value of "natural selection," "environment," "heredity," "disease," "temperature," etc., in particular cases. Lord Walsingham, in his Presidential Address to the Fellows of the Entomological Society of London, 1890, says: "An especially interesting line of enquiry as connected with the use and value of colour in insects, is that which has been followed up in Mr. Tuttt's series of papers on 'Melanism and Melanochroism.'"

**To be obtained from the Author, Rayleigh Villa, Westcombe Hill  
Blackheath, S.E.**

---

### **SPECIAL INDEX**

**TO.**

### **The Entomologist's Record and Journal of Variation, VOL. VI.**

We should be very thankful if all our Subscribers would support us in this publication, as its production entails enormous labour, and its scientific value is undoubted.

**Price 1/-**

**To be sent to Mr. H. E. PAGE, 14, Nettleton Road, New Cross, S.E.**

"E.E.E.E."

**ABBOTT'S**

**"PHIT-EESI"**

**BOOTS.**

"E.E.E.E."

Corner of Holloway Road  
& Seven Sisters Road.

**WATKINS & DONCASTER.**

**Naturalists and Manufacturers of Entomological Apparatus and Cabinets.**

Boxing Nets, with or w/o frame, including Sails, 1/2, 2/-, 2/6. Folding Nets, 3/6, 4/-.  
Packets Boxes, 8d., 9d., 1/-, 1/6. Zinc Believing  
Boxes, 10d. to 1/6. Zinc Bird House, 6d. per dozen boxes. Ethnological Plates,  
second set of letters, 10d. per dozen. Pocket Kalthena, 3/6 to 10/6. Sewing Tin, with  
brush, 1/6, 2/-; Sewing Machine, ready for use, 1/9 per tin. Store Boxes, with  
compartment cells, 2/6, 4/-, 5/-, 6/6. Sewing Boards, flat or oval, 1 in., 4d.; 1 1/2 in., 8d.;  
3 in., 10d.; 2 1/2 in., 1/-; 3 1/2 in., 1/4 - 4 ms., 1/6; 5 in., 1/18; Complete Set of four-piece  
Boards, 10/6. Setting Houses, 9/6, 1/6; corked back 14/- Zinc Terra Boxes, 3d.,  
1/-, 1/6. Breeding Cage, 2/6, 4/-, 5/-, 7/6. Coleopterist's Collecting Bottle, with vane,  
1/6, 1/8. Botanical Cases, japanned, double tin, 1/6 to 7/6. Botanical Paper, 1/L, 1/4,  
1/9, 2/9 per quire. Insect Glazed Cases, 2/6 to 11/-. Cement for replacing Antennae,  
6d. per bottle. Steel Forceps, 1/6, 2/-, 2/6 per pair. Cabinet Cork, 7 by 8 1/2, best quality,  
1/4 per dozen sheets Brass Omelette Bottle, 2/- Insect Lens, 1/- to 8/-. Glass top  
and Glass-bottomed Boxes, from 1/4 per dozen. Zinc Killing Box, 9d., 1/- Paper  
Digger, in leather sheath, 1/9. Taxidermist's Companion, containing most necessary  
implements for skinning, 10/6. Scalpels, 1/3; Scissors, 2/- per pair; Egg-drills, 2d., 3d.,  
1/-; Blowpipes, 6d.; Artificial Eyes for Birds and Animals; Label-Lists of British  
Butterflies, 2d.; List of Birds' Eggs, 3d., 4d., 6d.; List of Land and Fresh-water  
Shells, 1d.; Useful Books on Insects, Eggs, etc.

1/6 Our new complete Catalogue of British Lepidoptera (every species numbered), 1/- or on one side for labels, 2/-.

**THE "DIXON" LAMP NET (Invaluable for taking moths off Street Lamps without climbing the Lamp Posts) 2/6.**

## SHOW ROOM FOR CABINETS

Of every description of INSECTS, BEES, COONS, MICROSCOPICAL OBJECTS, FOSSILS, &c.  
Catalogue (66 pages) sent on application, post free.

**A LARGE STOCK OF INSECTS' AND BIRDS' EGGS (British, European and Exotic)**  
*Birds, Mammals, etc., Preserved and Mounted by First-class Workmen.*

Only Address—**36, STRAND; LONDON, W.C.** (5 doors from Charing Cross).



# Indian Agricultural Research Institute (Pusa)

LIBRARY, NEW DELHI-110012

This book can be issued on or before .....

Return Date	Return Date